

PROJECT MANUAL

**TERRA LINDA HIGH SCHOOL
INNOVATION HUB
320 NOVA ALBION WAY
SAN RAFAEL, CALIFORNIA 94903**

for

**SAN RAFAEL CITY SCHOOLS
310 NOVA ALBION WAY
SAN RAFAEL, CALIFORNIA, 94903**



**DSA FILE: 21-H1
DSA APPL.: 01-117586
PTN: 65466-28
HED PROJ. NO. 2017-03489**

**DSA SUBMITTAL
JUNE 2018**

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PROJECT

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06/08/18

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END OF DOCUMENT

06/08/18

TABLE OF CONTENTS

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

INTRODUCTORY INFORMATION

Document	
00 01 01	Project Title Page
00 01 05	Consultants Page
00 01 10	Table of Contents
00 01 15	List of Drawings

PROCUREMENT REQUIREMENTS

Document	
00 11 16	Notice to Bidders
00 21 13	Instructions to Bidders
00 21 13.1	Bidder Information and Forms
00 31 19	Existing Conditions
00 31 26	Existing Hazardous Material Information
00 31 32	Geotechnical Data
00 41 13	Bid Form and Proposal
00 43 13	Bid Bond
00 43 36	Designated Subcontractors List
00 45 01	Site Visit Certification
00 45 19	Non-Collusion Declaration
00 45 19.01	Iran Contracting Act Certification
00 45 26	Workers' Compensation Certification
00 45 46.01	Prevailing Wage and Related Labor Requirements Certification
00 45 46.02	Disabled Veteran Business Enterprise Participation Certification
00 45 46.03	Drug-Free Workplace Certification
00 45 46.04	Tobacco-Free Environment Certification
00 45 46.05	Hazardous Materials Certification
00 45 46.06	Lead-Based Materials Certification
00 45 46.07	Imported Materials Certification
00 45 46.08	Criminal Background Investigation/Fingerprinting Certification
00 45 46.09	Buy American Certification
00 45 46.10	Roofing Project Certification
00 45 49	Registered Subcontractors List
00 45 90	Post-Bid Interview

CONTRACTING REQUIREMENTS

Document	
00 51 00	Notice of Award
00 52 13	Agreement Form – Stipulated Sum (Single-Prime Contract)
00 55 00	Notice to Proceed
00 56 00	Escrow Bid Documentation
00 57 00	Escrow Agreement in Lieu of Retention
00 61 13.13	Performance Bond
00 61 13.16	Payment Bond
00 63 40	Allowance Expenditure Directive Form
00 63 57	Proposed Change Order Form
00 63 63	Change Order Form
00 65 19.26	Agreement and Release of Any and All Claims
00 65 36	Guarantee Form
00 72 13	General Conditions - Stipulated Sum (Single-Prime Contract)
00 73 13	Special Conditions
00 73 56	Hazardous Materials Procedures and Requirements

DIVISION 01 - GENERAL REQUIREMENTS

Section	
01 11 00	Summary of Work
01 21 00	Allowance
01 22 00	Alternates and Unit Pricing
01 25 13	Product Options and Substitutions
01 26 00	Changes in the Work
01 29 00	Application for Payment and Conditional and Unconditional Waiver and Release Forms
01 31 19	Project Meetings
01 32 13	Scheduling of Work
01 33 00	Submittals
01 35 13.23	Site Standards
01 35 16	Alteration Project Procedures
01 41 00	Regulatory Requirements
01 42 13	Abbreviations and Acronyms
01 42 16	Definitions
01 42 19	References
01 45 00	Quality Control ▪ DSA-103 - Listing of Structural Tests & Special Inspections - 2016 CBC
01 50 00	Temporary Facilities and Controls
01 52 13	Field Offices
01 60 00	Materials and Equipment
01 64 00	Owner-Furnished Products
01 66 00	Product Delivery, Storage and Handling
01 71 23	Field Engineering
01 73 29	Cutting and Patching
01 74 19	Construction Waste Management and Disposal
01 77 00	Contract Closeout and Final Cleaning
01 78 23	Operation and Maintenance Data
01 78 36	Warranties
01 78 39	Record Documents

DIVISION 02 - EXISTING CONDITIONS

Section	
02 41 19	Selective Demolition

DIVISION 03 - CONCRETE

Section	
03 11 00	Concrete Forming
03 20 00	Concrete Reinforcing
03 30 00	Cast-in-Place Concrete
03 35 43	Polished Concrete Finishing

DIVISION 04 - MASONRY - Not Used

DIVISION 05 - METALS

Section	
05 12 00	Structural Steel Framing
05 31 00	Steel Decking
05 40 00	Cold-Formed Metal Framing
05 50 00	Metal Fabrications

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

Section	
06 10 53	Miscellaneous Rough Carpentry
06 16 00	Sheathing
06 20 23	Interior Finish Carpentry
06 41 16	Plastic-Laminate-Clad Architectural Cabinets

06 42 19	Framed Decorative Panel System
06 64 01	FRP Paneling

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

Section	
07 21 00	Thermal Insulation
07 25 00	Weather Barriers
07 42 93	Metal Soffit Panels
07 52 00	Modified Bitumen Membrane Roofing
07 62 00	Sheet Metal Flashing and Trim
07 71 29	Manufactured Roof Expansion Joints
07 84 13	Penetration Firestopping
07 84 43	Joint Firestopping
07 92 00	Joint Sealants

DIVISION 08 - OPENINGS

Section	
08 12 13	Hollow Metal Frames
08 14 16	Flush Wood Doors
08 31 16	Access Doors and Frames
08 41 13	Aluminum-Framed Entrances and Storefronts
08 56 72	Sound Control Windows
08 71 00	Door Hardware
08 80 00	Glazing

DIVISION 09 - FINISHES

Section	
09 05 61.13	Moisture Vapor Emission Control
09 22 16	Non-Structural Metal Framing
09 24 00.13	Acrylic-Modified Portland Cement Plastering
09 29 00	Gypsum Board
09 51 13	Acoustical Panel Ceilings
09 65 13	Resilient Base and Accessories
09 65 19	Resilient Tile Flooring
09 65 43	Linoleum Flooring
09 68 13	Tile Carpeting
09 77 23	Fabric Covered Tack Paneling
09 84 33	Sound-Absorbing Wall Units
09 91 00	Painting

DIVISION 10 - SPECIALTIES

Section	
10 11 00	Visual Display Units
10 14 00	Signage
10 26 13	Corner Guards
10 44 00	Fire Protection Specialties

DIVISION 11 - EQUIPMENT

Section	
11 52 13	Projection Screens

DIVISION 12 - FURNISHINGS

Section	
12 24 13	Roller Window Shades

DIVISION 13 - SPECIAL CONSTRUCTION - Not Used.

DIVISION 14 - CONVEYING EQUIPMENT - Not Used.

DIVISION 21 - FIRE SUPPRESSION

Section
21 13 13 Wet-Pipe Fire Sprinkler System

DIVISION 22 - PLUMBING

Section
22 47 13 Drinking Fountains

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)

Section
23 05 00 General Mechanical Provisions
23 05 93 Testing, Adjusting and Balancing
23 07 00 Mechanical Insulation
23 09 00 HVAC Instrumentation and Controls
23 31 00 Ductwork and Accessories
23 37 13 Air Outlets and Inlets
23 74 33 Packaged Air Conditioning Unit

DIVISION 25 - INTEGRATED AUTOMATION - Not Used**DIVISION 26 - ELECTRICAL**

Section
26 05 00 Basic Electrical Materials and Methods
26 05 13 Conductors and Cables
26 05 33 Raceways and Boxes
26 09 23 Lighting Control Devices
26 27 26 Wiring Devices
26 51 00 Interior Lighting
26 56 00 Exterior Lighting

DIVISION 27 - COMMUNICATIONS

Section
27 00 00 General Technology Requirements
27 15 00 Horizontal Cabling

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

Section
28 31 00 Fire Alarm System

DIVISION 31 – EARTHWORK

Section
31 10 00 Site Preparation and Plant Protection
32 20 00 Earthwork

DIVISION 32 - EXTERIOR IMPROVEMENTS - Not Used

Section
32 13 13 Concrete Paving
32 17 23 Pavement Markings

DIVISION 33 - UTILITIES

Section
33 40 00 Storm Drainage

END OF DOCUMENT

06/08/18

DOCUMENT 00 01 15

LIST OF DRAWINGS

GENERAL

G-000 COVER SHEET
G-001 GENERAL INFORMATION
G-003 SIGNAGE DETAILS
G-012 CODE ANALYSIS & ACCESSIBILITY SITE PLAN

CIVIL

C-000 TITLE SHEET
C-001 GRADING SPEC
C-100 DEMO PLAN
C-101 GRADING AND DRAINAGE
C-500 DETAILS

STRUCTURAL

S1.1 GENERAL NOTES
S2.1 FOUNDATION PLAN & ROOF FRAMING
S5.1 DETAILS

ARCHITECTURAL

A-001 ARCHITECTURAL GENERAL INFORMATION
AS-001 ARCHITECTURAL SITE PLAN
AD-101 ARCHITECTURAL DEMOLITION FLOOR PLAN
AD-121 ARCHITECTURAL DEMOLITION REFLECTED CEILING PLAN
A-101 IMPROVEMENT FLOOR PLAN
A-103 ENLARGED FLOOR PLANS AND DETAILS
A-121 ARCHITECTURAL REFLECTED CEILING PLAN
A-201 EXTERIOR ELEVATIONS
A-301 BUILDING SECTIONS
A-302 BUILDING SECTIONS
A-303 BUILDING SECTIONS
A-401 INTERIOR ELEVATIONS
A-402 INTERIOR ELEVATIONS
A-501 SCHEDULE AND DETAILS
A-502 WALL/PARTITION ASSEMBLIES, WALL FURRING DETAILS, FIRERATED
ASSEMBLIES
A-521 METAL FRAMING DETAILS
A-531 ROOF DETAILS
A-561 DOOR DETAILS
A-562 WINDOW DETAILS
A-571 DETAILS SUSPENDED CEILING ASSEMBLY TYPICAL
A-572 DETAILS SUSPENDED CEILING TYPICAL, PART B
A-573 DETAILS SUSPENDED CEILING MTL. DECK, STEEL, COMP DECK
A-574 DETAILS SUSPENDED CEILING ASSEMBLY WOOD, CONC.
A-581 CASEWORK DETAILS
A-591 MISCELLANEOUS DETAILS
A-602 DOOR SCHEDULE AND DETAILS
A-603 WINDOW SCHEDULE AND DETAILS

MECHANICAL

M001	MECHANICAL LEGENDS AND NOTES
M002	MECHANICAL SCHEDULES AND DETAILS
M003	MECHANICAL CONTROLS
M101	MECHANICAL DEMO PLAN
M201	MECHANICAL FLOOR PLAN AND SECTION
M301	MECHANICAL ROOF PLAN

FIRE SPRINKLER SYSTEM

FP001	FIRE SPRINKLER SYSTEM: NOTES AND SYMBOLS
FP101	FIRE SPRINKLER SYSTEM: DEMO FLOOR PLAN
FP201	FIRE SPRINKLER SYSTEM: FLOOR PLAN AND DETAILS

ELECTRICAL

E0.1	GENERAL NOTES, LEGEND, ABBREVIATIONS AND DRAWING INDEX
E0.2	CERTIFICATE OF COMPLIANCE TITLE 24
E1.0	LIGHTING DEMOLITION PLAN
E1.1	LIGHTING PLAN
E2.0	ELECTRICAL DEMOLITION PLAN
E2.1	ELECTRICAL PLAN
E2.2	POWER PLAN - ROOF
E3.1	SIGNAL PLAN
E4.1	PARTIAL SINGLE LINE DIAGRAM AND SIGNAL RISER DIAGRAM
E5.1	SCHEDULES AND DETAILS
E5.2	DETAILS

FIRE ALARM

FA1.0	FIRE ALARM PLAN
FA1.1	FIRE ALARM SITE PLAN
FA2.1	FIRE ALARM PLAN
FA3.1	FIRE ALARM RISER DIAGRAM, LEGEND AND EQUIPMENT LIST
FA4.1	FIRE ALARM VOLTAGE DROP AND BATTERY CALCULATION
FA5.1	FIRE ALARM DETAILS

END OF DOCUMENT

06/08/18

DOCUMENT 00 11 16

NOTICE TO BIDDERS

1. Notice is hereby given that the governing board ("Board") of the San Rafael City Schools ("District") will receive sealed bids for the following project, Bid No. _____, Bid Package _____ ("Project" or "Contract"):

Terra Linda High School – Innovation Hub

2. The Project consists of renovation of existing Library space into classrooms; reconfiguration of interior walls; addition of doors and windows at the interior and exterior; modification of the fire alarm and fire sprinkler systems as required for reconfigured space.
3. To bid on this Project, the Bidder is required to possess one or more of the following State of California contractors' license(s):

B

The Bidder's license(s) must remain active and in good standing throughout the term of the Contract.

4. To bid on this Project, the Bidder is required to be registered as a public works contractor with the Department of Industrial Relations pursuant to the Labor Code. The Bidder's registration must remain active throughout the term of the Contract.
5. Contract Documents will be available on or after [Date TBD], 2018, for review at the District Facilities Office. In addition, Contract Documents are available for bidders' review at the following builders' exchanges:
 - A. Builder's Exchange of Marin County (415) 462 – 1220.
 - B. Marin IJ website.
 - C. San Rafael City Schools website.
6. Contract Documents are also available for purchase for _____ dollars (\$ _____) at the District Facilities Office. This fee is refundable if the Contract Documents are returned in clean condition back to the District Facilities Office no later than ten (10) calendar days after the date of the bid opening.
7. Sealed bids will be received until 2:00 p.m., _____, 2018, at the District Facilities Office, 310 Nova Albion Way, San Rafael, California 94903, at or after which time the bids will be opened and publicly read aloud. Any bid that is submitted after this time shall be nonresponsive and returned to the bidder. Any claim by a bidder of error in its bid must be made in compliance with section 5100 et seq. of the Public Contract Code.
8. Pursuant to Public Contract Code section 20111.6, only prequalified bidders will be eligible to submit a bid for contracts \$1 million or more using or planning to use state bond funds. Any bid submitted by a bidder who is not prequalified shall be non-responsive and returned unopened to the bidder. Moreover, any bid listing subcontractors holding C-4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43 or C-46 licenses, if used, who have not been prequalified, shall be deemed nonresponsive and will not be considered.
9. All bids shall be on the form provided by the District. Each bid must conform and be responsive to all pertinent Contract Documents, including, but not limited to, the Instructions to Bidders.

10. A bid bond by an admitted surety insurer on the form provided by the District, cash, or a cashier's check or a certified check, drawn to the order of the San Rafael City Schools, in the amount of ten percent (10%) of the total bid price, shall accompany the Bid Form and Proposal, as a guarantee that the Bidder will, within seven (7) calendar days after the date of the Notice of Award, enter into a contract with the District for the performance of the services as stipulated in the bid.
11. A mandatory pre-bid conference and site visit will be held on _____, 2018, at 2:00 p.m. at Terra Linda High School, 320 Nova Albion Way, San Rafael, California. All participants are required to sign-in in front of the Administration Building at Terra Linda High School, San Rafael, California. The site visit is expected to take approximately 1 hour. Failure to attend or tardiness will render bid ineligible.
12. The successful Bidder shall be required to furnish a 100% Performance Bond and a 100% Payment Bond if it is awarded the Contract for the Work.
13. Not Used.
14. The successful Bidder may substitute securities for any monies withheld by the District to ensure performance under the Contract, in accordance with the provisions of section 22300 of the Public Contract Code.
15. Not Used.
16. The Contractor and all Subcontractors under the Contractor shall pay all workers on all Work performed pursuant to this Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the District, pursuant to section 1770 et seq. of the California Labor Code. Prevailing wage rates are also available from the District or on the Internet at: <<http://www.dir.ca.gov>>.
17. This Project is subject to labor compliance monitoring and enforcement by the Department of Industrial Relations pursuant to Labor Code section 1771.4 and subject to the requirements of Title 8 of the California Code of Regulations. The Contractor and all Subcontractors under the Contractor shall furnish electronic certified payroll records directly to the Labor Commissioner weekly and within ten (10) days of any request by the District or the Labor Commissioner. The successful Bidder shall comply with all requirements of Division 2, Part 7, Chapter 1, Articles 1-5 of the Labor Code.
18. Not Used.
19. Not Used.
20. Not Used.
21. The District shall award the Contract, if it awards it at all, to the lowest responsive responsible bidder based on:
 - A. The base bid amount only.

END OF DOCUMENT

06/06/18

INSTRUCTIONS TO BIDDERS

Bidders shall follow the instructions in this document, and shall submit all documents, forms, and information required for consideration of a bid.

San Rafael City Schools ("District") will evaluate information submitted by the apparent low Bidder and, if incomplete or unsatisfactory to District, Bidder's bid may be rejected at the sole discretion of District.

1. Bids are requested for a general construction contract, or work described in general, for the following project ("Project" or "Contract"):

Terra Linda High School – Innovation Hub

2. A Bidder and its subcontractors must possess the appropriate State of California contractors' license and must maintain the license throughout the duration of the project. Bidders must also be registered as a public works contractor with the Department of Industrial Relations pursuant to the Labor Code. Bids submitted by a contractor who is not properly licensed or registered shall be deemed nonresponsive and will not be considered.
3. [The District has prequalified bidders pursuant to Public Contract Code section 20111.6 for contracts \$1 million or more using or planning to use state bond funds. Only prequalified bidders will be eligible to submit a bid for this Project. Any bid submitted by a bidder who is not prequalified shall be deemed nonresponsive and will not be considered. Moreover, any bid listing subcontractors holding C-4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43 or C-46 licenses, if used, who have not been prequalified, shall be deemed nonresponsive and will not be considered[A1].
4. District will receive sealed bids from bidders as stipulated in the Notice to Bidders.
 - a. All bids must be sealed in an envelope, marked with the name and address of the Bidder, name of the Project, the Project Number and/or bid number, and time of bid opening.
 - b. Bids must be submitted to the District Office by date and time shown in the Notice to Bidders.
 - c. Bids must contain all documents as required herein.
5. Bidders are advised that on the date that bids are opened, telephones will not be available at the District Offices for use by bidders or their representatives.
6. Bids will be opened at or after the time indicated for receipt of bids.
7. Bidders must submit bids on the documents titled Bid Form and Proposal, and must submit all other required District forms. Bids not submitted on the District's required forms shall be deemed nonresponsive and shall not be considered. Additional sheets required to fully respond to requested information are permissible.
8. Bidders shall not modify the Bid Form and Proposal or qualify their bids. Bidders shall not submit to the District a re-formatted, re-typed, altered, modified, or otherwise recreated version of the Bid Form and Proposal or other District-provided document.
9. Bids shall be clearly written and without erasure or deletions. District reserves the right to reject any bid containing erasures, deletions, or illegible contents.

10. Bidders must supply all information required by each Bid Document. Bids must be full and complete. District reserves the right in its sole discretion to reject any bid as nonresponsive as a result of any error or omission in the bid. Bidders must complete and submit all of the following documents with the Bid Form and Proposal:
 - a. Bid Bond on the District's form, or other security.
 - b. Designated Subcontractors List.
 - c. Site Visit Certification, if a site visit was required.
 - d. Non-Collusion Declaration.
 - e. Iran Contracting Act Certification, if contract value is \$1,000,000 or more[A2].
11. Bidders must submit with their bids cash, a cashier's check or a certified check payable to District, or a bid bond by an admitted surety insurer of not less than ten percent (10%) of amount of Base Bid, plus all additive alternates ("Bid Bond"). If Bidder chooses to provide a Bid Bond as security, Bidder must use the required form of corporate surety provided by District. The Surety on Bidder's Bid Bond must be an insurer admitted in the State of California and authorized to issue surety bonds in the State of California. Bids submitted without necessary bid security will be deemed nonresponsive and will not be considered.
12. If Bidder to whom the Contract is awarded fails or neglects to enter into the Contract and submit required bonds, insurance certificates, and all other required documents, within **SEVEN (7)** calendar days after the date of the Notice of Award, District may deposit Bid Bond, cash, cashier's check, or certified check for collection, and proceeds thereof may be retained by District as liquidated damages for failure of Bidder to enter into Contract, in the sole discretion of District. It is agreed that calculation of damages District may suffer as a result of Bidder's failure to enter into the Contract would be extremely difficult and impractical to determine and that the amount of the Bidder's required bid security shall be the agreed and conclusively presumed amount of damages.
13. Bidders must submit with the bid the Designated Subcontractors List for those subcontractors who will perform any portion of Work, including labor, rendering of service, or specially fabricating and installing a portion of the Work or improvement according to detailed drawings contained in the plans and specifications, in excess of one half of one percent (0.5%) of total bid. Failure to submit this list when required by law shall result in bid being deemed nonresponsive and the bid will not be considered.
14. All of the listed subcontractors are required to be registered as a public works contractor with the Department of Industrial Relations pursuant to the Labor Code.
 - a. An inadvertent error in listing the California contractor license number on the Designated Subcontractors List shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive if the correct contractor's license number is submitted to the District within 24 hours after the bid opening and the corrected number corresponds with the submitted name and location for that subcontractor.
 - b. An inadvertent error listing an unregistered subcontractor shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive provided that any of the following apply:
 - (1) The subcontractor is registered prior to the bid opening.
 - (2) The subcontractor is registered and has paid the penalty registration fee within 24 hours after the bid opening.

- (3) The subcontractor is replaced by another registered subcontractor pursuant to Public Contract Code section 4107.
15. If a mandatory pre-bid conference and site visit ("Site Visit") is required as referenced in the Notice to Bidders, then Bidders must submit the Site Visit Certification with their Bid. District will transmit to all prospective Bidders of record such Addenda as District in its discretion considers necessary in response to questions arising at the Site Visit. Oral statements shall not be relied upon and will not be binding or legally effective. Addenda issued by the District as a result of the Site Visit, if any, shall constitute the sole and exclusive record and statement of the results of the Site Visit.
16. Bidders shall submit the Non-Collusion Declaration with their bids. Bids submitted without the Non-Collusion Declaration shall be deemed nonresponsive and will not be considered.
17. The Contractor and all Subcontractors under the Contractor shall pay all workers on all work performed pursuant to the Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the District, pursuant to sections 1770 et seq. of the California Labor Code. Copies of the general prevailing rates of per diem wages for each craft, classification, or type of worker needed to execute the Contract, as determined by Director of the Department of Industrial Relations, are available upon request at the District's principal office. Prevailing wage rates are also available on the internet at <http://www.dir.ca.gov>.
18. Not Used. [A3].
19. Section 17076.11 of the Education Code requires school districts using funds allocated pursuant to the State of California School Facility Program for the construction and/or modernization of school building(s) to have a participation goal for disabled veteran business enterprises ("DVBE") of at least three percent (3%) per year of the overall dollar amount expended on projects that receive state funding or demonstrate its good faith effort to solicit DVBE participation in this Contract. In order to meet this requirement by demonstrating a good faith effort, Bidder must advertise for DVBE-certified subcontractors and suppliers before submitting its Bid. For any project that is at least partially state-funded, the lowest responsive responsible Bidder awarded the Contract must submit certification of compliance with the procedures for implementation of DVBE contracting goals with its signed Agreement. DVBE Certification form is attached. Do not submit this form with your Bid[A4][A5].
20. Submission of bid signifies careful examination of Contract Documents and complete understanding of the nature, extent, and location of Work to be performed. Bidders must complete the tasks listed below as a condition to bidding, and submission of a bid shall constitute the Bidder's express representation to District that Bidder has fully completed the following:
- a. Bidder has visited the Site, if required, and has examined thoroughly and understood the nature and extent of the Contract Documents, Work, Site, locality, actual conditions, as-built conditions, and all local conditions and federal, state and local laws, and regulations that in any manner may affect cost, progress, performance, or furnishing of Work or that relate to any aspect of the means, methods, techniques, sequences, or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto;
 - b. Bidder has conducted or obtained and has understood all examinations, investigations, explorations, tests, reports, and studies that pertain to the subsurface conditions, as-built conditions, underground facilities, and all other physical conditions at or contiguous to the Site or otherwise that may affect the cost, progress, performance, or furnishing of Work, as Bidder considers necessary for the performance or furnishing of Work at the Contract Sum, within the Contract Time, and in accordance with the other

terms and conditions of Contract Documents, including specifically the provisions of the General Conditions; and no additional examinations, investigations, explorations, tests, reports, studies, or similar information or data are or will be required by Bidder for such purposes;

- c. Bidder has correlated its knowledge and the results of all such observations, examinations, investigations, explorations, tests, reports, and studies with the terms and conditions of the Contract Documents;
- d. Bidder has given the District prompt written notice of all conflicts, errors, ambiguities, or discrepancies that it has discovered in or among the Contract Documents and the actual conditions, and the written resolution(s) thereof by the District is/are acceptable to Bidder;
- e. Bidder has made a complete disclosure in writing to the District of all facts bearing upon any possible interest, direct or indirect, that Bidder believes any representative of the District or other officer or employee of the District presently has or will have in this Contract or in the performance thereof or in any portion of the profits thereof;
- f. Bidder must, prior to bidding, perform the work, investigations, research, and analysis required by this document and that Bidder represented in its Bid Form and Proposal and the Agreement that it performed prior to bidding. Contractor under this Contract is charged with all information and knowledge that a reasonable bidder would ascertain from having performed this required work, investigation, research, and analysis. Bid prices must include entire cost of all work "incidental" to completion of the Work.
- g. Conditions Shown on the Contract Documents: Information as to underground conditions, as-built conditions, or other conditions or obstructions, indicated in the Contract Documents, e.g., on Drawings or in Specifications, has been obtained with reasonable care, and has been recorded in good faith. However, District only warrants, and Bidder may only rely, on the accuracy of limited types of information.
 - (1) As to above-ground conditions or as-built conditions shown or indicated in the Contract Documents, there is no warranty, express or implied, or any representation express or implied, that such information is correctly shown or indicated. This information is verifiable by independent investigation and Bidder is required to make such verification as a condition to bidding. In submitting its Bid, Bidder shall rely on the results of its own independent investigation. In submitting its Bid, Bidder shall not rely on District-supplied information regarding above-ground conditions or as-built conditions.
 - (2) As to any subsurface condition shown or indicated in the Contract Documents, Bidder may rely only upon the general accuracy of actual reported depths, actual reported character of materials, actual reported soil types, actual reported water conditions, or actual obstructions shown or indicated. District is not responsible for the completeness of such information for bidding or construction; nor is District responsible in any way for any conclusions or opinions that the Bidder has drawn from such information; nor is the District responsible for subsurface conditions that are not specifically shown (for example, District is not responsible for soil conditions in areas contiguous to areas where a subsurface condition is shown).
- h. Conditions Shown in Reports and Drawings Supplied for Informational Purposes: Reference is made to the document entitled Geotechnical Data, and the document entitled Existing Conditions, for identification of:
 - (1) Subsurface Conditions: Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that have been utilized by Architect in preparing the Contract Documents; and

- (2) Physical Conditions: Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that has been utilized by Architect in preparing the Contract Documents.
 - (3) These reports and drawings are **not** Contract Documents and, except for any "technical" data regarding subsurface conditions specifically identified in Geotechnical Data and Existing Conditions, and underground facilities data, Bidder may not in any manner rely on the information in these reports and drawings. Subject to the foregoing, Bidder must make its own independent investigation of all conditions affecting the Work and must not rely on information provided by District.
21. Bids shall be based on products and systems specified in Contract Documents or listed by name in Addenda. Whenever in the Specifications any materials, process, or article is indicated or specified by grade, patent, or proprietary name, or by name of manufacturer, that Specification shall be deemed to be followed by the words "or equal." Bidder may, unless otherwise stated, offer any material, process, or article that shall be substantially equal or better in every respect to that so indicated or specified. The District is not responsible and/or liable in any way for a Contractor's damages and/or claims related, in any way, to that Contractor's basing its bid on any requested substitution that the District has not approved in advance and in writing. Contractors and materials suppliers who submit requests for substitutions prior to the award of the Contract must do so in writing and in compliance with Public Contract Code section 3400. All requests must comply with the following:
- a. District must receive any notice of request for substitution of a specified item a minimum of **TEN (10)** calendar days prior to bid opening. The Successful Bidder will not be allowed to substitute specified items unless properly noticed.
 - b. Within 35 days after the date of the Notice of Award, the Successful Bidder shall submit data substantiating the request(s) for all substitution(s) containing sufficient information to assess acceptability of product or system and impact on Project, including, without limitation, the requirements specified in the Special Conditions and the Specifications. Insufficient information shall be grounds for rejection of substitution.
 - c. Approved substitutions, if any, shall be listed in Addenda. District reserves the right not to act upon submittals of substitutions until after bid opening.
 - d. Substitutions may be requested after Contract has been awarded only if indicated in and in accordance with requirements specified in the Special Conditions and the Specifications.
22. Bidders may examine any available "as-built" drawings of previous work by giving District reasonable advance notice. District will not be responsible for accuracy of "as-built" drawings. The document entitled Existing Conditions applies to all supplied "as-built" drawings.
23. All questions about the meaning or intent of the Contract Documents are to be directed via email to the District to Hector DeLeon, hector.deleon@vpcsonline.com and Dan Zaich (Senior Director Capital Facilities) dzaich@srcs.org; 310 Nova Albion Way, Sana Rafael, CA 94903; on or before Tuesday, _____, 2018 at 2:00 P.M. [A6]. Interpretations or clarifications considered necessary by the District in response to such questions will be issued in writing by Addenda and emailed, faxed, mailed, or delivered to all parties recorded by the District as having received the Contract Documents or posted on the District's website. Responses will be emailed and posted on the District website by 2:00 P.M. on Tuesday April 3, 2018. [A7]. Questions received less than **SEVEN (7)** calendar days prior to the date for opening bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
24. Addenda may also be issued to modify other parts of the Contract Documents as deemed advisable by the District.

25. Each Bidder must acknowledge each Addendum in its Bid Form and Proposal by number or its Bid shall be considered non-responsive. Each Addendum shall be part of the Contract Documents. A complete listing of Addenda may be secured from the District.
26. This Contract may include alternates. Alternates are defined as alternate products, materials, equipment, systems, methods, or major elements of the construction that may, at the District's option and under terms established in the Contract and pursuant to section 20103.8 of the Public Contract Code, be selected for the Work.
27. The District shall award the Contract, if it awards it at all, to the lowest responsive responsible bidder based on the criteria as indicated in the Notice to Bidders. In the event two or more responsible bidders submit identical bids, the District shall select the Bidder to whom to award the Contract by lot.
28. Time for Completion: District may issue a Notice to Proceed within **NINETY (90)** days from the date of the Notice of Award. Once Contractor has received the Notice to Proceed, Contractor shall complete the Work within the period of time indicated in the Contract Documents.
- a. In the event that the District desires to postpone issuing the Notice to Proceed beyond this 90-day period, it is expressly understood that with reasonable notice to the Contractor, the District may postpone issuing the Notice to Proceed.
 - b. It is further expressly understood by Contractor that Contractor shall not be entitled to any claim of additional compensation as a result of the postponement of the issuance of the Notice to Proceed beyond a 90-day period. If the Contractor believes that a postponement of issuance of the Notice to Proceed will cause a hardship to the Contractor, the Contractor may terminate the Contract. Contractor's termination due to a postponement beyond this 90-day period shall be by written notice to District within **TEN (10)** calendar days after receipt by Contractor of District's notice of postponement.
 - c. It is further understood by the Contractor that in the event that Contractor terminates the Contract as a result of postponement by the District, the District shall only be obligated to pay Contractor for the Work that Contractor had performed at the time of notification of postponement and which the District had in writing authorized Contractor to perform prior to issuing a Notice to Proceed.
 - d. Should the Contractor terminate the Contract as a result of a notice of postponement, District shall have the authority to award the Contract to the next lowest responsive responsible bidder.
29. The Bidder to whom Contract is awarded shall execute and submit the following documents by 5:00 p.m. of the **SEVENTH (7th)** calendar day following the date of the Notice of Award. Failure to properly and timely submit these documents entitles District to reject the bid as nonresponsive.
- a. Agreement: To be executed by successful Bidder. Submit four (4) copies, each bearing an original signature.
 - b. Escrow of Bid Documentation: This must include all required documentation. See the document titled Escrow Bid Documentation for more information.
 - c. Performance Bond (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.
 - d. Payment Bond (Contractor's Labor and Material Bond) (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.
 - e. Insurance Certificates and Endorsements as required.

- f. Workers' Compensation Certification.
 - g. Prevailing Wage and Related Labor Requirements Certification.
 - h. Not Used.[A8].
 - i. [Drug-Free Workplace Certification][A9].
 - j. [Tobacco-Free Environment Certification][A10].
 - k. [Hazardous Materials Certification][A11].
 - l. [Lead-Based Materials Certification][A12].
 - m. Not Used.[A13].
 - n. Criminal Background Investigation/Fingerprinting Certification.
 - o. Not Used.[A14].
 - p. Not Used. [A15].
 - q. Registered Subcontractors List: Must include Department of Industrial Relations (DIR) registration number of each subcontractor for all tiers.
30. Any bid protest by any Bidder regarding any other bid must be submitted in writing to the District, before 5:00 p.m. of the **THIRD (3rd)** business day following bid opening.
- a. Only a Bidder who has actually submitted a bid, and who could be awarded the Contract if the bid protest is upheld, is eligible to submit a bid protest. Subcontractors are not eligible to submit bid protests. A Bidder may not rely on the bid protest submitted by another Bidder.
 - b. A bid protest must contain a complete statement of any and all bases for the protest and all supporting documentation. Materials submitted after the bid protest deadline will not be considered.
 - c. The protest must refer to the specific portions of all documents that form the basis for the protest.
 - (1) Without limitation to any other basis for protest, an inadvertent error in listing the California contractor's license number on the Designated Subcontractors List shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive if the correct contractor's license number is submitted to the District within 24 hours after the bid opening and the corrected number corresponds with the submitted name and location for that subcontractor.
 - (2) Without limitation to any other basis for protest, an inadvertent error listing an unregistered subcontractor shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive provided that any of the following apply:
 - (i) The subcontractor is registered prior to the bid opening.
 - (ii) The subcontractor is registered and has paid the penalty registration fee within 24 hours after the bid opening.
 - (iii) The subcontractor is replaced by another registered subcontractor pursuant to Public Contract Code section 4107.

- d. The protest must include the name, address and telephone number of the person representing the protesting party.
 - e. The party filing the protest must concurrently transmit a copy of the protest and any attached documentation to all other parties with a direct financial interest that may be adversely affected by the outcome of the protest. Such parties shall include all other bidders or proposers who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.
 - f. The procedure and time limits set forth in this paragraph are mandatory and are each bidder's sole and exclusive remedy in the event of bid protest. Failure to comply with these procedures shall constitute a waiver of any right to further pursue the bid protest, including filing a Government Code Claim or legal proceedings.
31. District reserves the right to reject any or all bids, including without limitation the right to reject any or all nonconforming, nonresponsive, unbalanced, or conditional bids, to re-bid, and to reject the bid of any bidder if District believes that it would not be in the best interest of the District to make an award to that bidder, whether because the bid is not responsive or the bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by District. District also reserves the right to waive any inconsequential deviations or irregularities in any bid. For purposes of this paragraph, an "unbalanced bid" is one having nominal prices for some work items and/or enhanced prices for other work items.
32. Discrepancies between written words and figures, or words and numerals, will be resolved in favor of figures or numerals.
33. It is the policy of the District that no qualified person shall be excluded from participating in, be denied the benefits of, or otherwise be subjected to discrimination in any consideration leading to the award of contract, based on race, color, gender, sexual orientation, political affiliation, age, ancestry, religion, marital status, national origin, medical condition or disability. The Successful Bidder and its subcontractors shall comply with applicable federal and state laws, including, but not limited to the California Fair Employment and Housing Act, beginning with Government Code section 12900, and Labor Code section 1735.
34. Prior to the award of Contract, District reserves the right to consider the responsibility of the Bidder. District may conduct investigations as District deems necessary to assist in the evaluation of any bid and to establish the responsibility, including, without limitation, qualifications and financial ability of Bidders, proposed subcontractors, suppliers, and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to District's satisfaction within the prescribed time.

END OF DOCUMENT

06/06/18

DOCUMENT 00 21 13.1

BIDDER INFORMATION AND FORMS

[INTENTIONALLY LEFT BLANK UNLESS PROVIDED IN SPECIAL CONDITIONS
– SEPARATE PREQUALIFICATION PROCESS RECOMMENDED]

END OF DOCUMENT

06/06/18

EXISTING CONDITIONS

1. SUMMARY

This document describes existing conditions at or near the Project, and use of information available regarding existing conditions. This document is **not** part of the Contract Documents. See General Conditions for definition(s) of terms used herein.

2. REPORTS AND INFORMATION ON EXISTING CONDITIONS

- a. Documents providing a general description of the Site and conditions of the Work may have been collected by San Rafael City Schools ("District"), its consultants, contractors, and tenants. These documents may, but are not required to, include previous contracts, contract specifications, tenant improvement contracts, as-built drawings, utility drawings, and information regarding underground facilities.
- b. Information regarding existing conditions may be inspected at the District offices or the Construction Manager's offices, if any, and copies may be obtained at cost of reproduction and handling upon Bidder's agreement to pay for such copies. These reports, documents, and other information are **not** part of the Contract Documents. These reports, documents, and other information do **not** excuse Contractor from fulfilling Contractor's obligation to independently investigate any or all existing conditions or from using reasonable prudent measures to avoid damaging existing improvements.
- c. Information regarding existing conditions may also be included in the Project Manual, but shall **not** be considered part of the Contract Documents.
- d. Prior to commencing this Work, Contractor and the District's representative shall survey the Site to document the condition of the Site. Contractor will record the survey in digital videotape format and provide an electronic copy to the District within fourteen (14) days of the survey.
- e. Contractor may also document any pre-existing conditions in writing, provided that both the Contractor and the District's representative agree on said conditions and sign a memorandum documenting the same.
- f. The reports and other data or information regarding existing conditions and underground facilities at or contiguous to the Project are the following:
 - (1) Original Construction Drawings.
 - (2) Survey of Site.
 - (3) Geotechnical Report(s).
 - (4) Hazardous Material Report(s).

3. USE OF INFORMATION

- a. Information regarding existing conditions was obtained only for use of District and its consultants, contractors, and tenants for planning and design and is **not** part of the Contract Documents.
- b. District does not warrant, and makes no representation regarding, the accuracy or thoroughness of any information regarding existing conditions. Bidder represents and agrees that in submitting a bid it is not relying on any information regarding existing conditions supplied by District.

- c. Under no circumstances shall District be deemed to warrant or represent existing above-ground conditions, as-built conditions, or other actual conditions, verifiable by independent investigation. These conditions are verifiable by Bidder by the performance of its own independent investigation that Bidder must perform as a condition to bidding and Bidder should not and shall not rely on this information or any other information supplied by District regarding existing conditions.
- d. Any information shown or indicated in the reports and other data supplied herein with respect to existing underground facilities at or contiguous to the Project may be based upon information and data furnished to District by the District's employees and/or consultants or builders of such underground facilities or others. District does not assume responsibility for the completeness of this information, and Bidder is solely responsible for any interpretation or conclusion drawn from this information.
- e. District shall be responsible only for the general accuracy of information regarding underground facilities, and only for those underground facilities that are owned by District, and only where Bidder has conducted the independent investigation required of it pursuant to the Instructions to Bidders, and discrepancies are not apparent.

4. INVESTIGATIONS/SITE EXAMINATIONS

- a. Before submitting a bid, each Bidder is responsible for conducting or obtaining any additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the Site or otherwise, that may affect cost, progress, performance, or furnishing of Work or that relate to any aspect of the means, methods, techniques, sequences, or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or that Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of Contract Documents.
- b. On request, District will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies, as each Bidder deems necessary for submission of a bid. Bidders must fill all holes and clean up and restore the Site to its former condition upon completion of its explorations, investigations, tests, and studies. Such investigations and Site examinations may be performed during any and all Site visits indicated in the Notice to Bidders and only under the provisions of the Contract Documents, including, but not limited to, proof of insurance and obligation to indemnify against claims arising from such work, and District's prior approval.

END OF DOCUMENT

06/06/18

EXISTING HAZARDOUS MATERIAL INFORMATION

1.1 EXISTING HAZARDOUS MATERIAL INFORMATION

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.
- B. A Limited Pre-Renovation Hazardous Materials Report, prepared by Terracon Consultants, Inc., dated February 5, 2018, is available for viewing as appended to this Document.
- C. Related Requirements:
 - 1. Document 00 21 13 "Instructions to Bidders" for the Bidder's responsibilities for examination of Project site and existing conditions.
 - 2. Document 00 31 32 "Geotechnical Data" for reports and soil-boring data from geotechnical investigations that are made available to bidders.
 - 3. Section 02 41 16 "Structure Demolition" for notification requirements if materials suspected of containing hazardous materials are encountered.

END OF DOCUMENT

06/06/18

GEOTECHNICAL DATA

1. SUMMARY

This document describes geotechnical data at or near the Project that is in the District's possession available for Contractor's review, and use of data resulting from various investigations. This document is **not** part of the Contract Documents. See General Conditions for definition(s) of terms used herein.

2. GEOTECHNICAL REPORTS

- A. Geotechnical reports may have been prepared for and around the Site and/or in connection with the Work by soil investigation engineers hired by San Rafael City Schools ("District"), and its consultants, contractors, and tenants.
- B. Geotechnical reports may be inspected at the District offices or the Construction Manager's offices, if any, and copies may be obtained at cost of reproduction and handling upon Bidder's agreement to pay for such copies. These reports are **not** part of the Contract Documents.
- C. The reports and drawings of physical conditions that may relate to the Project are the following:

Design Level Geotechnical Investigation and
Geologic Hazards Study Report
Terra Linda High School
320 Nova Albion Way
San Rafael, Marin County, California

Prepared by: A3GEO, Inc.
Date: February 16, 2018

3. USE OF DATA

- A. Geotechnical data were obtained only for use of District and its consultants, contractors, and tenants for planning and design and are **not** a part of Contract Documents.
- B. Except as expressly set forth below, District does not warrant, and makes no representation regarding, the accuracy or thoroughness of any geotechnical data. Bidder represents and agrees that in submitting a Bid it is not relying on any geotechnical data supplied by District, except as specifically allowed below.
- C. Under no circumstances shall District be deemed to make a warranty or representation of existing above ground conditions, as-built conditions, geotechnical conditions, or other actual conditions verifiable by independent investigation. These conditions are verifiable by Contractor by the performance of its own independent investigation that Contractor should perform as a condition to bidding and Contractor must not and shall not rely on information supplied by District.

4. LIMITED RELIANCE PERMITTED ON CERTAIN INFORMATION

A. Reference is made herein for identification of:

Reports of explorations and tests of subsurface conditions at or contiguous to the Site that have been utilized by District in preparation of the Contract Documents.

Drawings of physical conditions in or relating to existing subsurface structures (except underground facilities) that are at or contiguous to the Site and have been utilized by District in preparation of the Contract Documents.

B. Bidder may rely upon the general accuracy of the "technical data" contained in the reports and drawings identified above, but only insofar as it relates to subsurface conditions, provided Bidder has conducted the independent investigation required pursuant to Instructions to Bidders, and discrepancies are not apparent. The term "technical data" in the referenced reports and drawings shall be limited as follows:

- 1) The term "technical data" shall include actual reported depths, reported quantities, reported soil types, reported soil conditions, and reported material, equipment or structures that were encountered during subsurface exploration. The term "technical data" does not include, and Bidder may not rely upon, any other data, interpretations, opinions or information shown or indicated in such drawings or reports that otherwise relate to subsurface conditions or described structures.
- 2) The term "technical data" shall not include the location of underground facilities.
- 3) Bidder may not rely on the completeness of reports and drawings for the purposes of bidding or construction. Bidder may rely upon the general accuracy of the "technical data" contained in such reports or drawings.
- 4) Bidder is solely responsible for any interpretation or conclusion drawn from any "technical data" or any other data, interpretations, opinions, or information provided in the identified reports and drawings.

5. INVESTIGATIONS/SITE EXAMINATIONS

A. Before submitting a Bid, each Bidder is responsible for conducting or obtaining any additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the Site or otherwise, that may affect cost, progress, performance, or furnishing of Work or that relate to any aspect of the means, methods, techniques, sequences, or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or that Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of Contract Documents.

B. On request, District will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies, as each Bidder deems necessary for submission of a Bid. Bidders must fill all holes and clean up and restore the Site to its former condition upon completion of its explorations, investigations, tests, and studies. Such investigations and Site examinations may be performed during any and all Site visits indicated in the Notice to Bidders and only under the provisions of the Contract Documents, including, but not limited to, proof of insurance and obligation to indemnify against claims arising from such work, and District's prior approval.

END OF DOCUMENT

06/06/18

BID FORM AND PROPOSAL

To: Governing Board of the San Rafael City Schools ("District" or "Owner")

From: _____
(Proper Name of Bidder)

The undersigned declares that Bidder has read and understands the Contract Documents, including, without limitation, the Notice to Bidders and the Instructions to Bidders, and agrees and proposes to furnish all necessary labor, materials, and equipment to perform and furnish all work in accordance with the terms and conditions of the Contract Documents, including, without limitation, the Drawings and Specifications of Bid No. _____.

PROJECT: Terra Linda High School – Innovation Hub.

("Project" or "Contract") and will accept in full payment for that Work the following total lump sum amount, all taxes included:

_____ dollars \$ _____
BASE BID

Bidder acknowledges and agrees that the Base Bid accounts for any and all Allowance(s), and Total Cost for Unit Prices.

Additive Alternates:

Alternate #1 -

_____ dollars \$ _____
Additive

Alternate #2 –

_____ dollars \$ _____
Additive

Descriptions of alternates are primarily scope definitions and do not necessarily detail the full range of materials and processes needed to complete the construction.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

Additional Detail Regarding Calculation of Base Bid

1. Not Used,.
2. **Allowance**[A1]. The Bidder's Base Bid and each alternate shall include a ten percent (10%) allowance for unforeseen items.

The above allowance shall only be allocated for unforeseen items relating to the Work. Contractor shall not bill for or be due any portion of this allowance unless the District has identified specific work, Contractor has submitted a price for that work or the District has proposed a price for that work, the District has accepted the cost for that work, and the District has prepared an Allowance Expenditure Directive incorporating that work. Contractor hereby authorizes the District to execute a unilateral deductive change order at or near the end of the Project for all or any portion of the allowance not allocated.

3. Not Used.
4. The undersigned has reviewed the Work outlined in the Contract Documents and fully understands the scope of Work required in this Proposal, understands the construction and project management function(s) is described in the Contract Documents, and that each Bidder who is awarded a contract shall be in fact a prime contractor, not a subcontractor, to the District, and agrees that its Proposal, if accepted by the District, will be the basis for the Bidder to enter into a contract with the District in accordance with the intent of the Contract Documents.
5. The undersigned has notified the District in writing of any discrepancies or omissions or of any doubt, questions, or ambiguities about the meaning of any of the Contract Documents, and has contacted the Construction Manager before bid date to verify the issuance of any clarifying Addenda.
6. The undersigned agrees to commence work under this Contract on the date established in the Contract Documents and to complete all work within the time specified in the Contract Documents.
7. The liquidated damages clause of the General Conditions and Agreement is hereby acknowledged.
8. It is understood that the District reserves the right to reject this bid and that the bid shall remain open to acceptance and is irrevocable for a period of ninety (90) days.
9. The following documents are attached hereto:
 - Bid Bond on the District's form or other security
 - Designated Subcontractors List
 - **Site Visit Certification**[A2]
 - Non-Collusion Declaration
 - **Iran Contracting Act Certification**[A3]

10. Receipt and acceptance of the following Addenda is hereby acknowledged:

No. _____, Dated _____	No. _____, Dated _____
No. _____, Dated _____	No. _____, Dated _____
No. _____, Dated _____	No. _____, Dated _____

11. Bidder acknowledges that the license required for performance of the Work is a _____ license.
12. The undersigned hereby certifies that Bidder is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Work.
13. Not Used.
14. Not Used.
15. The Bidder represents that it is competent, knowledgeable, and has special skills with respect to the nature, extent, and inherent conditions of the Work to be performed. Bidder further acknowledges that there are certain peculiar and inherent conditions existent in the construction of the Work that may create, during the Work, unusual or peculiar unsafe conditions hazardous to persons and property.
16. Bidder expressly acknowledges that it is aware of such peculiar risks and that it has the skill and experience to foresee and to adopt protective measures to adequately and safely perform the Work with respect to such hazards.
17. Bidder expressly acknowledges that it is aware that if a false claim is knowingly submitted (as the terms "claim" and "knowingly" are defined in the California False Claims Act, Gov. Code, § 12650 et seq.), the District will be entitled to civil remedies set forth in the California False Claim Act. It may also be considered fraud and the Contractor may be subject to criminal prosecution.
18. The undersigned Bidder certifies that it is, at the time of bidding, and shall be throughout the period of the Contract, licensed by the State of California to do the type of work required under the terms of the Contract Documents and registered as a public works contractor with the Department of Industrial Relations. Bidder further certifies that it is regularly engaged in the general class and type of work called for in the Contract Documents.

Furthermore, Bidder hereby certifies to the District that all representations, certifications, and statements made by Bidder, as set forth in this bid form, are true and correct and are made under penalty of perjury.

Dated this _____ day of _____, 2018

Name of Bidder: _____

Type of Organization: _____

Signed by: _____

Title of Signer: _____

Address of Bidder: _____

Taxpayer Identification No. of Bidder: _____

Telephone Number: _____

Fax Number: _____

E-mail: _____ Web Page: _____

Contractor's License No(s): No.: _____ Class: _____ Expiration Date: _____

 No.: _____ Class: _____ Expiration Date: _____

 No.: _____ Class: _____ Expiration Date: _____

Public Works Contractor Registration No.: _____

END OF DOCUMENT

06/06/18

BID BOND

(Note: If Bidder is providing a bid bond as its bid security, Bidder must use this form, NOT a surety company form.)

KNOW ALL PERSONS BY THESE PRESENTS:

That the undersigned, _____, as Principal ("Principal"),

and _____, as Surety ("Surety"), a corporation organized and existing under and by virtue of the laws of the State of California and authorized to do business as a surety in the State of California, are held and firmly bound unto the San Rafael City Schools ("District") of Marin County, State of California, as Obligee, in an amount equal to ten percent (10%) of the Base Bid plus alternates, in the sum of

_____ Dollars (\$ _____)

lawful money of the United States of America, for the payment of which sum well and truly to be made, we, and each of us, bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has submitted a bid to the District for all Work specifically described in the accompanying bid for the following project: _____ ("Project" or "Contract").

NOW, THEREFORE, if the Principal is awarded the Contract and, within the time and manner required under the Contract Documents, after the prescribed forms are presented to Principal for signature, enters into a written contract, in the prescribed form in accordance with the bid, and files two bonds, one guaranteeing faithful performance and the other guaranteeing payment for labor and materials as required by law, and meets all other conditions to the Contract between the Principal and the Obligee becoming effective, or if the Principal shall fully reimburse and save harmless the Obligee from any damage sustained by the Obligee through failure of the Principal to enter into the written contract and to file the required performance and labor and material bonds, and to meet all other conditions to the Contract between the Principal and the Obligee becoming effective, then this obligation shall be null and void; otherwise, it shall be and remain in full force and effect. The full payment of the sum stated above shall be due immediately if Principal fails to execute the Contract within seven (7) days of the date of the District's Notice of Award to Principal.

Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or the call for bids, or to the work to be performed thereunder, or the specifications accompanying the same, shall in any way affect its obligation under this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or the call for bids, or to the work, or to the specifications.

In the event suit is brought upon this bond by the Obligee and judgment is recovered, the Surety shall pay all costs incurred by the Obligee in such suit, including a reasonable attorneys' fee to be fixed by the Court.

If the District awards the bid, the security of unsuccessful bidder(s) shall be returned within sixty (60) days from the time the award is made. Unless otherwise required by law, no bidder may withdraw its bid for ninety (90) days after the date of the bid opening.

IN WITNESS WHEREOF, this instrument has been duly executed by the Principal and Surety above named, on the _____ day of _____, 20____.

Principal

By

Surety

By

Name of California Agent of Surety

Address of California Agent of Surety

Telephone Number of California Agent of Surety

Bidder must attach Power of Attorney and Certificate of Authority for Surety and a Notarial Acknowledgment for all Surety's signatures. The California Department of Insurance must authorize the Surety to be an admitted Surety Insurer.

END OF DOCUMENT

06/06/18

DESIGNATED SUBCONTRACTORS LIST
(Public Contact Code Sections 4100-4114)

PROJECT: Terra Linda High School – Innovation Hub

Bidder acknowledges and agrees that it must clearly set forth below the name, location and California contractor license number of each subcontractor who will perform work or labor or render service to the Bidder in or about the construction of the Work or who will specially fabricate and install a portion of the Work according to detailed drawings contained in the plans and specifications in an amount in excess of one-half of one percent (0.5%) of Bidder's total Base Bid and the kind of Work that each will perform. Vendors or suppliers of materials only do not need to be listed.

Bidder acknowledges and agrees that, if Bidder fails to list as to any portion of Work, or if Bidder lists more than one subcontractor to perform the same portion of Work, Bidder must perform that portion itself or be subjected to penalty under applicable law. In case more than one subcontractor is named for the same kind of Work, state the portion of the kind of Work that each subcontractor will perform.

If alternate bid(s) is/are called for and Bidder intends to use subcontractors different from or in addition to those subcontractors listed for work under the Base Bid, Bidder must list subcontractors that will perform Work in an amount in excess of one half of one percent (0.5%) of Bidder's total Base Bid plus alternate(s).

If further space is required for the list of proposed subcontractors, attach additional copies of page 2 showing the required information, as indicated below.

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Date: _____

Proper Name of Bidder: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

06/06/18

SITE VISIT CERTIFICATION

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID
IF SITE VISIT WAS MANDATORY

PROJECT: Terra Linda High School – Innovation Hub

Check option that applies:

_____ I certify that I visited the Site of the proposed Work and became fully acquainted with the conditions relating to construction and labor. I fully understand the facilities, difficulties, and restrictions attending the execution of the Work under contract.

_____ I certify that _____ (Bidder's representative) visited the Site of the proposed Work and became fully acquainted with the conditions relating to construction and labor. The Bidder's representative fully understood the facilities, difficulties, and restrictions attending the execution of the Work under contract.

Bidder fully indemnifies the San Rafael City Schools, its Architect, its Engineer, its Construction Manager, and all of their respective officers, agents, employees, and consultants from any damage, or omissions, related to conditions that could have been identified during my visit and/or the Bidder's representative's visit to the Site.

I certify under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Date: _____
Proper Name of Bidder: _____
Signature: _____
Print Name: _____
Title: _____

END OF DOCUMENT

06/06/18

NON-COLLUSION DECLARATION
(Public Contract Code Section 7106)

The undersigned declares:

I am the _____ of _____, the party making the foregoing bid.
[Title] [Name of Firm]

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or to refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that this declaration is executed on _____,
[Date]

at _____,
[City] [State]

Date: _____

Proper Name of Bidder: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

06/06/18

IRAN CONTRACTING ACT CERTIFICATION
(Public Contract Code Sections 2202-2208)

PROJECT/CONTRACT NO.: _____ between San Rafael City Schools
 ("District") and _____ ("Contractor" or
 "Bidder") ("Contract" or "Project").

Prior to bidding on or submitting a proposal for a contract for goods or services of \$1,000,000 or more, the bidder/proposer must submit this certification pursuant to Public Contract Code section 2204.

The bidder/proposer must complete **ONLY ONE** of the following two options. To complete OPTION 1, check the corresponding box **and** complete the certification below. To complete OPTION 2, check the corresponding box, complete the certification below, and attach documentation demonstrating the exemption approval.

- ☐ **OPTION 1.** Bidder/Proposer is not on the current list of persons engaged in investment activities in Iran created by the California Department of General Services ("DGS") pursuant to Public Contract Code section 2203(b), and we are not a financial institution extending twenty million dollars (\$20,000,000) or more in credit to another person, for 45 days or more, if that other person will use the credit to provide goods or services in the energy sector in Iran and is identified on the current list of persons engaged in investment activities in Iran created by DGS.
- ☐ **OPTION 2.** Bidder/Proposer has received a written exemption from the certification requirement pursuant to Public Contract Code sections 2203(c) and (d). *A copy of the written documentation demonstrating the exemption approval is included with our bid/proposal.*

CERTIFICATION:

I, the official named below, CERTIFY UNDER PENALTY OF PERJURY, that I am duly authorized to legally bind the bidder/proposer to the OPTION selected above. This certification is made under the laws of the State of California.

Vendor Name/Financial Institution (Printed)	Federal ID Number (or n/a)
By (Authorized Signature)	
Printed Name and Title of Person Signing	Date Executed

END OF DOCUMENT

06/06/18

WORKERS' COMPENSATION CERTIFICATION

PROJECT/CONTRACT NO.: _____ between San Rafael City Schools
("District") and _____ ("Contractor" or "Bidder")
("Contract" or "Project").

Labor Code section 3700, in relevant part, provides:

Every employer except the State shall secure the payment of compensation in one or more of the following ways:

- a. By being insured against liability to pay compensation by one or more insurers duly authorized to write compensation insurance in this state; and/or
- b. By securing from the Director of Industrial Relations a certificate of consent to self-insure, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his employees.

I am aware of the provisions of section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the Work of this Contract.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

(In accordance with Labor Code sections 1860 and 1861, the above certificate must be signed and filed with the awarding body prior to performing any Work under this Contract.)

END OF DOCUMENT

06/06/18

**PREVAILING WAGE AND
RELATED LABOR REQUIREMENTS CERTIFICATION**

PROJECT/CONTRACT NO.: _____ between San Rafael City Schools
("District") and _____ ("Contractor" or
"Bidder") ("Contract" or "Project").

I hereby certify that I will conform to the State of California Public Works Contract requirements regarding prevailing wages, benefits, on-site audits with 48-hours notice, payroll records, and apprentice and trainee employment requirements, for all Work on the above Project including, without limitation, labor compliance monitoring and enforcement by the Department of Industrial Relations.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

06/06/18

**DISABLED VETERAN BUSINESS
ENTERPRISE PARTICIPATION CERTIFICATION**

PROJECT/CONTRACT NO.: _____ between the San Rafael City Schools ("District") and _____
 _____ ("Contractor" or "Bidder") ("Contract" or "Project").

GENERAL INSTRUCTIONS

Section 17076.11 of the Education Code requires school districts using, or planning to use, funds allocated pursuant to the State of California School Facility Program ("Program") for the construction and/or modernization of school buildings to have a participation goal for disabled veteran business enterprises ("DVBE") of at least three percent (3%) per year of the overall dollar amount expended each year by the school district on projects that receive state funding. Therefore, the lowest responsive responsible Bidder awarded the Contract must submit this document to the District with its executed Agreement, identifying the steps contractor took to solicit DVBE participation in conjunction with this Contract. **Do not submit this form with your bids.**

PART I – Method of Compliance with DVBE Participation Goals. Check the appropriate box to indicate your method of committing the contract dollar amount.

YOUR BUSINESS ENTERPRISE IS:	AND YOU WILL	AND YOU WILL
A. ☐ Disabled veteran owned and your forces will perform at least 3% of this Contract	Include a copy of your DVBE letter from Office of Small Business and Disabled Veterans Business Enterprise Services ("OSDS")*	Complete Part 1 of this form and the Certification
B. ☐ Disabled veteran owned but is unable to perform 3% of this Contract with your forces	Use DVBE subcontractors /suppliers to bring the Contract participation to at least 3%	Include a copy of each DVBE's letter from OSDS (including yours, if applicable), and complete Part 1 of this form and the Certification
C. ☐ NOT disabled veteran owned	Use DVBE subcontractors /suppliers for at least 3% of this Contract	
D. ☐ Unable to meet the required participation goals	Complete all of this form and the Certification	

* A DVBE letter from OSDS is obtained from the participating DVBE.

You must complete the following table to show the dollar amount of DVBE participation:

	TOTAL CONTRACT PRICE
A. Prime Bidder, if DVBE (own participation)	\$
B. DVBE Subcontractor or Supplier	
1.	
2.	
3.	
4.	
C. Subtotal (A & B)	
D. Non-DVBE	
E. Total Bid	

PART II – Contacts. To identify DVBE subcontractors/suppliers for participation in your contract, you must contact each of the following categories. You should contact several DVBE organizations.

CATEGORY	TELEPHONE NUMBER	DATE CONTACTED	PERSON CONTACTED
1. The District, if any			*
2. OSDS, provides assistance locating DVBEs at https://caleprocure.ca.gov/pages/PublicSearch/supplier-search.aspx	(916) 375-4940		*
3. DVBE Organization (List)			*

*Write "recorded message" in this column, if applicable.

PART III – Advertisement. You must advertise for DVBE participation in both a trade and focus paper. List the advertisement you place to solicit DVBE participation. Advertisements should be published at least fourteen (14) days prior to bid/proposal opening; if you cannot advertise fourteen (14) days prior, advertisements should be published as soon as possible. Advertisements must include that your firm is seeking DVBE participation, the project name and location, and your firm's name, your contact person, and telephone number. Attach copies of advertisements to this form.

FOCUS/TRADE PAPER NAME	CHECK ONE		DATE OF ADVERTISEMENT
	TRADE	FOCUS	

PART IV – DVBE Solicitations. List DVBE subcontractors/suppliers that were invited to bid. Use the following instructions to complete the remainder of this section (read the three columns as a sentence from left to right). If you need additional space to list DVBE solicitations, please use a separate page and attach to this form.

IF THE DVBE.....	THEN.....	AND.....
was selected to participate	Check "YES" in the "SELECTED" column	include a copy of their DVBE letter(s) from OSDS
was NOT selected to participate	Check "NO" in the "SELECTED" column	state why in the "REASON NOT SELECTED" column
did not respond to your solicitation	Check the "NO RESPONSE" column.	
DVBE CONTACTED	SELECTED	REASON NOT SELECTED
	YES NO	NO RESPONSE

A copy of this form must be retained by you and may be subject to a future audit.

CERTIFICATION

I, _____, certify that I am the bidder's _____ and that I have made a diligent effort to ascertain the facts with regard to the representations made herein. In making this certification, I am aware of section 12650 et seq. of the Government Code providing for the imposition of treble damages for making false claims.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

06/06/18

DRUG-FREE WORKPLACE CERTIFICATION

PROJECT/CONTRACT NO.: _____ between San Rafael City Schools ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

This Drug-Free Workplace Certification form is required from the successful Bidder pursuant to Government Code section 8350 et seq., the Drug-Free Workplace Act of 1990. The Drug-Free Workplace Act of 1990 requires that every person or organization awarded a contract or grant for the procurement of any property or service from any state agency must certify that it will provide a drug-free workplace by doing certain specified acts. In addition, the Act provides that each contract or grant awarded by a state agency may be subject to suspension of payments or termination of the contract or grant, and the contractor or grantee may be subject to debarment from future contracting, if the contracting agency determines that specified acts have occurred.

The District is not a "state agency" as defined in the applicable section(s) of the Government Code, but the District is a local agency and public school district under California law and requires all contractors on District projects to comply with the provisions and requirements of Government Code section 8350 et seq., the Drug-Free Workplace Act of 1990.

Contractor shall certify that it will provide a drug-free workplace by doing all of the following:

- a. Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance is prohibited in the person's or organization's workplace and specifying actions which will be taken against employees for violations of the prohibition.
- b. Establishing a drug-free awareness program to inform employees about all of the following:
 - (1) The dangers of drug abuse in the workplace.
 - (2) The person's or organization's policy of maintaining a drug-free workplace.
 - (3) The availability of drug counseling, rehabilitation, and employee-assistance programs.
 - (4) The penalties that may be imposed upon employees for drug abuse violations.
- c. Requiring that each employee engaged in the performance of the contract or grant be given a copy of the statement required above, and that, as a condition of employment on the contract or grant, the employee agrees to abide by the terms of the statement.

I, the undersigned, agree to fulfill the terms and requirements of Government Code section 8355 listed above and will publish a statement notifying employees concerning (a) the prohibition of controlled substance at the workplace, (b) establishing a drug-free awareness program, and (c) requiring that each employee engaged in the performance of the Contract be given a copy of the statement required by section 8355(a), and requiring that the employee agree to abide by the terms of that statement.

I also understand that if the District determines that I have either (a) made a false certification herein, or (b) violated this certification by failing to carry out the requirements of section 8355, that the Contract awarded herein is subject to termination, suspension of payments, or both. I further

understand that, should I violate the terms of the Drug-Free Workplace Act of 1990, I may be subject to debarment in accordance with the requirements of the aforementioned Act.

I acknowledge that I am aware of the provisions of Government Code section 8350 et seq. and hereby certify that I will adhere to the requirements of the Drug-Free Workplace Act of 1990.

Date:

Proper Name of Contractor:

Signature:

Print Name:

Title:

END OF DOCUMENT

06/06/18

TOBACCO-FREE ENVIRONMENT CERTIFICATION

PROJECT/CONTRACT NO.: _____ between San Rafael City Schools
("District") and _____ ("Contractor" or
"Bidder") ("Contract" or "Project").

This Tobacco-Free Environment Certification form is required from the successful Bidder.

Pursuant to, without limitation, 20 U.S.C section 6083, Labor Code section 6400 et seq., Health & Safety Code section 104350 et seq. and District Board Policies, all District sites, including the Project site, are tobacco-free environments. Smoking and the use of tobacco products by all persons is prohibited on or in District property. District property includes school buildings, school grounds, school owned vehicles and vehicles owned by others while on District property.

I acknowledge that I am aware of the District's policy regarding tobacco-free environments at District sites, including the Project site and hereby certify that I will adhere to the requirements of that policy and not permit any of my firm's employees, agents, subcontractors, or my firm's subcontractors' employees or agents to use tobacco and/or smoke on the Project site.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

06/06/18

HAZARDOUS MATERIALS CERTIFICATION

PROJECT/CONTRACT NO.: _____ between San Rafael City Schools
("District") and _____ ("Contractor" or
"Bidder") ("Contract" or "Project").

1. Contractor hereby certifies that no Asbestos, or Asbestos-Containing Materials, polychlorinated biphenyl (PCB), or any material listed by the federal or state Environmental Protection Agency or federal or state health agencies as a hazardous material, or any other material defined as being hazardous under federal or state laws, rules, or regulations ("New Hazardous Material"), shall be furnished, installed, or incorporated in any way into the Project or in any tools, devices, clothing, or equipment used to affect any portion of Contractor's work on the Project for District.
2. Contractor further certifies that it has instructed its employees with respect to the above-mentioned standards, hazards, risks, and liabilities.
3. Asbestos and/or asbestos-containing material shall be defined as all items containing but not limited to chrysotile, crocidolite, amosite, anthophyllite, tremolite, and actinolite. Any or all material containing greater than one-tenth of one percent (0.1%) asbestos shall be defined as asbestos-containing material.
4. Any disputes involving the question of whether or not material is New Hazardous Material shall be settled by electron microscopy or other appropriate and recognized testing procedure, at the District's determination. The costs of any such tests shall be paid by Contractor if the material is found to be New Hazardous Material.
5. All Work or materials found to be New Hazardous Material or Work or material installed with equipment containing "New Hazardous Material" will be immediately rejected and this Work will be removed at Contractor's expense at no additional cost to the District.
6. Contractor has read and understood the document Hazardous Materials Procedures & Requirements, and shall comply with all the provisions outlined therein.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

06/06/18

LEAD-BASED MATERIALS CERTIFICATION

PROJECT/CONTRACT NO.: _____ between San Rafael City Schools ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

This certification provides notice to the Contractor that:

- (1) Contractor's work may disturb lead-containing building materials.
- (2) Contractor shall notify the District if any work may result in the disturbance of lead-containing building materials.
- (3) Contractor shall comply with the Renovation, Repair and Painting Rule, if lead-based paint is disturbed in a six-square-foot or greater area indoors or a 20-square-foot or greater area outdoors.

1. Lead as a Health Hazard

Lead poisoning is recognized as a serious environmental health hazard facing children today. Even at low levels of exposure, much lower than previously believed, lead can impair the development of a child's central nervous system, causing learning disabilities, and leading to serious behavioral problems. Lead enters the environment as tiny lead particles and lead dust disburse when paint chips, chalks, peels, wears away over time, or is otherwise disturbed. Ingestion of lead dust is the most common pathway of childhood poisoning; lead dust gets on a child's hands and toys and then into a child's mouth through common hand-to-mouth activity. Exposures may result from construction or remodeling activities that disturb lead paint, from ordinary wear and tear of windows and doors, or from friction on other surfaces.

Ordinary construction and renovation or repainting activities carried out without lead-safe work practices can disturb lead-based paint and create significant hazards. Improper removal practices, such as dry scraping, sanding, or water blasting painted surfaces, are likely to generate high volumes of lead dust.

Because the Contractor and its employees will be providing services for the District, and because the Contractor's work may disturb lead-containing building materials, CONTRACTOR IS HEREBY NOTIFIED of the potential presence of lead-containing materials located within certain buildings utilized by the District. All school buildings built prior to 1978 are presumed to contain some lead-based paint until sampling proves otherwise.

2. Overview of California Law

Education Code section 32240 et seq. is known as the Lead-Safe Schools Protection Act. Under this act, the Department of Health Services is to conduct a sample survey of schools in the State of California for the purpose of developing risk factors to predict lead contamination in public schools. (Ed. Code, § 32241.)

Any school that undertakes any action to abate existing risk factors for lead is required to utilize trained and state-certified contractors, inspectors, and workers. (Ed. Code, § 32243, subd. (b).) Moreover, lead-based paint, lead plumbing, and solders, or other potential sources of lead contamination, shall not be utilized in the construction of any new school facility or the modernization or renovation of any existing school facility. (Ed. Code, § 32244.)

Both the Federal Occupational Safety and Health Administration ("Fed/OSHA") and the California Division of Occupational Safety and Health ("Cal/OSHA") have implemented safety

orders applicable to all construction work where a contractor's employee may be occupationally exposed to lead.

The OSHA Regulations apply to all construction work where a contractor's employee may be occupationally exposed to lead. The OSHA Regulations contain specific and detailed requirements imposed on contractors subject to that regulation. The OSHA Regulations define construction work as work for construction, alteration, and/or repair, including painting and decorating. It includes, but is not limited to, the following:

- a. Demolition or salvage of structures where lead or materials containing lead are present;
- b. Removal or encapsulation of materials containing lead;
- c. New construction, alteration, repair, or renovation of structures, substrates, or portions thereof, that contain lead, or materials containing lead;
- d. Installation of products containing lead;
- e. Lead contamination/emergency cleanup;
- f. Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed; and
- g. Maintenance operations associated with the construction activities described in the subsection.

Because it is assumed by the District that all painted surfaces (interior as well as exterior) within the District contain some level of lead, it is imperative that the Contractor, its workers and subcontractors fully and adequately comply with all applicable laws, rules and regulations governing lead-based materials (including title 8, California Code of Regulations, section 1532.1).

Contractor shall notify the District if any Work may result in the disturbance of lead-containing building materials. Any and all Work that may result in the disturbance of lead-containing building materials shall be coordinated through the District. A signed copy of this Certification shall be on file prior to beginning Work on the Project, along with all current insurance certificates.

3. **Renovation, Repair and Painting Rule, Section 402(c)(3) of the Toxic Substances Control Act**

The EPA requires lead safe work practices to reduce exposure to lead hazards created by renovation, repair and painting activities that disturb lead-based paint. Pursuant to the Renovation, Repair and Painting Rule (RRP), renovations in homes, childcare facilities, and schools built prior to 1978 must be conducted by certified renovations firms, using renovators with training by a EPA-accredited training provider, and fully and adequately complying with all applicable laws, rules and regulations governing lead-based materials, including those rules and regulations appearing within title 40 of the Code of Federal Regulations as part 745 (40 CFR 745).

The RRP requirements apply to all contractors who disturb lead-based paint in a six-square-foot or greater area indoors or a 20-square-foot or greater area outdoors. If a DPH-certified inspector or risk assessor determines that a home constructed before 1978 is lead-free, the federal certification is not required for anyone working on that particular building.

4. **Contractor's Liability**

If the Contractor fails to comply with any applicable laws, rules, or regulations, and that failure results in a site or worker contamination, the Contractor will be held solely responsible for all costs involved in any required corrective actions, and shall defend, indemnify, and hold harmless the District, pursuant to the indemnification provisions of the Contract, for all damages and other claims arising therefrom.

If lead disturbance is anticipated in the Work, only persons with appropriate accreditation, registrations, licenses, and training shall conduct this Work.

It shall be the responsibility of the Contractor to properly dispose of any and all waste products, including, but not limited to, paint chips, any collected residue, or any other visual material that may occur from the prepping of any painted surface. It will be the responsibility of the Contractor to provide the proper disposal of any hazardous waste by a certified hazardous waste hauler. This company shall be registered with the Department of Transportation (DOT) and shall be able to issue a current manifest number upon transporting any hazardous material from any school site within the District.

The Contractor shall provide the District with any sample results prior to beginning Work, during the Work, and after the completion of the Work. The District may request to examine, prior to the commencement of the Work, the lead training records of each employee of the Contractor.

THE CONTRACTOR HEREBY ACKNOWLEDGES, UNDER PENALTY OF PERJURY, THAT IT:

1. HAS RECEIVED NOTIFICATION OF POTENTIAL LEAD-BASED MATERIALS ON THE OWNER'S PROPERTY;
2. IS KNOWLEDGEABLE REGARDING AND WILL COMPLY WITH ALL APPLICABLE LAWS, RULES, AND REGULATIONS GOVERNING WORK WITH, AND DISPOSAL, OF LEAD.

THE UNDERSIGNED WARRANTS THAT HE/SHE HAS THE AUTHORITY TO SIGN ON BEHALF OF AND BIND THE CONTRACTOR. THE DISTRICT MAY REQUIRE PROOF OF SUCH AUTHORITY.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

06/06/18

IMPORTED MATERIALS CERTIFICATION

PROJECT/CONTRACT NO.: _____ between San Rafael City Schools ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

This form shall be executed by all entities that, in any way, provide or deliver and/or supply any soils, aggregate, or related materials ("Fill") to the Project Site and shall be provided to the District at least ten (10) days before delivery. All Fill shall satisfy all requirements of any environmental review of the Project performed pursuant to the statutes and guidelines of the California Environmental Quality Act, section 21000 et seq. of the Public Resources Code ("CEQA"), and all requirements of section 17210 et seq. of the Education Code, including requirements for a Phase I environmental assessment acceptable to the State of California Department of Education and Department of Toxic Substances Control.

Certification of: ☐ Delivery Firm/Transporter ☐ Supplier ☐ Manufacturer
☐ Wholesaler ☐ Broker ☐ Retailer
☐ Distributor ☐ Other _____

Type of Entity ☐ Corporation ☐ General Partnership
☐ Limited Partnership ☐ Limited Liability Company
☐ Sole Proprietorship ☐ Other _____

Name of firm ("Firm"): _____

Mailing address: _____

Addresses of branch office used for this Project: _____

If subsidiary, name and address of parent company: _____

By my signature below, I hereby certify that I am aware of section 25260 of the Health and Safety Code and the sections referenced therein regarding the definition of hazardous material. I further certify on behalf of the Firm that all soils, aggregates, or related materials provided, delivered, and/or supplied or that will be provided, delivered, and/or supplied by this Firm to the Project Site are free of any and all hazardous material as defined in section 25260 of the Health and Safety Code. I further certify that I am authorized to make this certification on behalf of the Firm.

Date: _____

Proper Name of Firm: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

06/06/18

CRIMINAL BACKGROUND INVESTIGATION /FINGERPRINTING CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the San Rafael City Schools ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

The undersigned does hereby certify to the governing board of the District as follows:

That I am a representative of the Contractor currently under contract with the District; that I am familiar with the facts herein certified; and that I am authorized and qualified to execute this certificate on behalf of Contractor.

Contractor certifies that it has taken at least one of the following actions with respect to the construction Project that is the subject of the Contract (check all that apply):

- ☐ The Contractor is a sole proprietor and intends to comply with the fingerprinting requirements of Education Code section 45125.1(k) with respect to all Contractor's employees who may have contact with District pupils in the course of providing services pursuant to the Contract, and hereby agrees to the District's preparation and submission of fingerprints such that the California Department of Justice may determine that none of those employees has been convicted of a felony, as that term is defined in Education Code section 45122.1. No work shall commence until such determination by DOJ has been made.

As an authorized District official, I am familiar with the facts herein certified, and am authorized to execute this certificate on behalf of the District and undertake to prepare and submit Contractor's fingerprints as if he or she was an employee of the District.

Date: _____

District Representative's Name and Title: _____

District Representative's Signature: _____

- ☐ The Contractor, who is not a sole proprietor, has complied with the fingerprinting requirements of Education Code section 45125.1 with respect to all Contractor's employees and all of its Subcontractors' employees who may have contact with District pupils in the course of providing services pursuant to the Contract, and the California Department of Justice has determined that none of those employees has been convicted of a felony, as that term is defined in Education Code section 45122.1. A complete and accurate list of Contractor's employees and of all of its subcontractors' employees who may come in contact with District pupils during the course and scope of the Contract is attached hereto; and/or
- ☐ Pursuant to Education Code section 45125.2, Contractor has installed or will install, prior to commencement of Work, a physical barrier at the Work Site, that will limit contact between Contractor's employees and District pupils at all times; and/or
- ☐ Pursuant to Education Code section 45125.2, Contractor certifies that all employees will be under the continual supervision of, and monitored by, an employee of the Contractor who the California Department of Justice has ascertained, or as described below, will ascertain, has not been convicted of a violent or serious felony. The name and title of the employee who will be supervising Contractor's and its subcontractors' employees is:

Name: _____

Title: _____

NOTE: If the Contractor is a sole proprietor, and elects the above option, Contractor must have the above-named employee's fingerprints prepared and submitted by the District, in accordance with Education Code section 45125.1(k). No work shall commence until such determination by DOJ has been made.

As an authorized District official, I am familiar with the facts herein certified, and am authorized to execute this certificate on behalf of the District and undertake to prepare and submit Contractor's fingerprints as if he or she was an employee of the District.

Date: _____

District Representative's Name and Title: _____

District Representative's Signature: _____

- ☐ *The Work on the Contract is either (i) at an unoccupied school site and no employee and/or subcontractor or supplier of any tier of the Contract shall come in contact with the District pupils or (ii) Contractor's employees or any subcontractor or supplier of any tier of the Contract will have only limited contact, if any, with District pupils and the District will take appropriate steps to protect the safety of any pupils that may come in contact with Consultant's employees, subcontractors or suppliers so that the fingerprinting and criminal background investigation requirements of Education Code section 45125.1 shall not apply to Contractor under the Contract.*

As an authorized District official, I am familiar with the facts herein certified, and am authorized to execute this certificate on behalf of the District.

Date: _____

District Representative's Name and Title: _____

District Representative's Signature: _____

Contractor's responsibility for background clearance extends to all of its employees, Subcontractors, and employees of Subcontractors coming into contact with District pupils regardless of whether they are designated as employees or acting as independent contractors of the Contractor.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

06/06/18

BUY AMERICAN CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the San Rafael City Schools ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

Federal regulations require that all of the iron, steel, and manufactured goods used in projects for the construction, installation, repairs, renovation, modernization, or maintenance of a public building or public work funded in part or in whole by federal stimulus funds, with the exception of projects funded by Qualified School Construction Bonds, be produced in the United States of America, unless a federal department waives this requirement because (1) it is inconsistent with the public interest, (2) the goods are not produced in sufficient quantities or of satisfactory quality in the United States, or (3) the requirement would increase the cost of the Project overall by more than twenty-five percent (25%) ("Buy American").

Contractor shall submit this Certification with its executed agreement, identifying the steps Contractor will take to use goods produced in the United States of America in carrying out this Contract. Bidder should not submit this form with its bid.

Contractor shall retain a copy of this form and may be subject to a future audit.

CERTIFICATION

On behalf of Contractor, I represent and covenant that Contractor will use on the Project only iron, steel and manufactured goods produced in the United States of America except goods for which a federal department has waived this requirement.

I, _____, certify that I am the Contractor's _____ and that the representations and covenants made herein are true and correct. In making this certification, I am aware of section 12650 et seq. of the Government Code providing for the imposition of treble damages for making false claims.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

06/06/18

Date: _____
Proper Name of Firm: _____
Signature: _____
Print Name: _____
Title: _____

END OF DOCUMENT

06/06/18

REGISTERED SUBCONTRACTORS LIST
(Labor Code Section 1771.1)[A1]

PROJECT: Terra Linda High School – Innovation Hub

Date Submitted (for Updates): _____

Contractor acknowledges and agrees that it must clearly set forth below the name and Department of Industrial Relations (DIR) registration number of each subcontractor **for all tiers** who will perform work or labor or render service to Contractor or its subcontractors in or about the construction of the Work **at least two (2) weeks before the subcontractor is scheduled to perform work**. This document is to be updated as all tiers of subcontractors are identified.

Contractor acknowledges and agrees that, if Contractor fails to list as to any subcontractor of any tier who performs any portion of Work, the Contract is subject to cancellation and the Contractor will be subjected to penalty under applicable law.

If further space is required for the list of proposed subcontractors, attach additional copies of page 2 showing the required information, as indicated below.

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

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Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Date: _____

Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

06/06/18

POST BID INTERVIEW

PART 1 – GENERAL

1.01 SUMMARY

If requested by the District, this Section requires the apparent low bidder to attend and participate in a Post Bid Interview with the Construction Manager, prior to award of any contract by the District. The Post Bid Interview will be scheduled by the Construction Manager within three (3) calendar days after the date of bid.

1.02 REQUIRED ATTENDANCE

- A. A duly authorized representative of the apparent low bidder is required to attend the Post Bid Interview, in person.
- B. The apparent low bidder's authorized representative must have signatory authority on behalf of the apparent low bidder.
- C. Failure to attend the Post Bid Interview will be considered just cause for the District to reject the Bid.

1.03 POST BID INTERVIEW PROCEDURE

- A. The Construction Manager will review the Bid with the attendees.
- B. The Construction Manager will review the Contract Documents with the attendees, including but not limited to:
 - (1) Insurance
 - (2) Bonding
 - (3) Addenda
 - (4) Pre-Bid Clarifications
 - (5) Scope of Work
 - (6) Bid Packages Descriptions
 - (7) Bid Alternates
 - (8) Contract Plans
 - (9) Contract Specifications
 - (10) Project Schedule and Schedule Requirements
 - (11) Critical Dates Requirement for Other Bid Packages
 - (12) Prevailing Wage Requirements
 - (13) Liquidated Damages

(14) Required Documentation for Contract Administration

(15) Contract Coordination Requirements

1.04 POST BID INTERVIEW DOCUMENTATION

The Construction Manager will document the Post Bid Interview on the form attached to this Section. Both the apparent low bidder and the Construction Manager are required to sign the Post Bid Interview Documentation.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

POST BID INTERVIEW

CONSTRUCTION MANAGER

[Name]
[Address 1]
[Address 2]
[Phone]

[Fax]

BIDDER: _____

DATE: _____ TIME: _____ PHONE: _____

I. INTRODUCTIONS:

A. Present

CONTRACTOR

CONTRACTOR

[CM]

[CM]

II. PROPOSED CONTRACT:

III. PURPOSE OF INTERVIEW IS TO ASSURE A MUTUAL UNDERSTANDING OF THE FOLLOWING:

A. Do you acknowledge submission of a complete and accurate bid?	Yes	No
B. Do you acknowledge the Bid Document submittal timelines after NOA and NTP and can you meet those timelines?	Yes	No
C. Do you acknowledge the requirements for the escrow of bid documents?	Yes	No
D. Are you comfortable with your listed subcontractors?	Yes	No

IV. CONTRACTUAL REQUIREMENTS:

A. Do you understand you are a prime contractor?	Yes	No
B. Can you meet specified insurance requirements?	Yes	No
1. Do any of your policies that require Additional Insured endorsements exceed the minimum coverage requirements?	Yes	No
2. Are you requesting that the District accept an Umbrella or Excess Liability Insurance Policy to meet the policy limit?	Yes	No
3. Will there be a gap between the per occurrence amount of any underlying policy and the start of the coverage under the Umbrella or Excess Liability Insurance Policy?	Yes	No
C. Will you provide the Performance Bond and Labor and Material Bond for 100% of the Contract Price as stipulated?	Yes	No

1.	Cost for bond: _____%	Yes	No
2.	Is the cost of your bond in your base bid?	Yes	No
3.	Is your surety licensed to issue bonds in California?	Yes	No
D.	Do you understand the fingerprinting requirements?	Yes	No
E.	Is it understood that all workers must be paid prevailing wage?	Yes	No
F.	Is it understood that all subcontractors of every tier must be registered as a public works contractor with the Department of Industrial Relations?	Yes	No
V. SCOPE OF WORK:			
A.	Acknowledged Receipt of Addenda #1-__	Yes	No
B.	Are the costs for addenda items included in your bid? (if applicable)	Yes	No
C.	Do you have a complete understanding of your Scope of Work under the proposed Agreement?	Yes	No
D.	You have re-reviewed the documents and understand the Scope of the Work. Are there any items that require clarification?	Yes	No
If yes, please identify them.			
1.	_____		

2.	_____		

3.	_____		

	Is (are) there additional cost(s) for the above item(s)?	Yes	No
E.	Have you reviewed bid alternative(s) #1-__? (if applicable)	Yes	No
F.	Are the costs for bid alternatives included in your bid?	Yes	No
G.	Are the plans and specifications clear and understandable to your satisfaction?	Yes	No
H.	Do you acknowledge that the time to submit notice of requests for substitution of specified materials has expired?	Yes	No
VI. SCHEDULE:			
A.	Do you acknowledge and agree to the stipulated completion dates and milestones in the contract?	Yes	No

1. Will you provide a detailed construction schedule to _____ within the required ten (10) days of the Notice to Proceed, per the contract? Yes No
2. Can you meet the submittal deadline? Yes No
3. It is understood that the Project schedule is critical and that that weekend and overtime work may be required to meet the milestones. Yes No
4. It is understood that if rain does occur, then all dewatering and protection of work is required, per the contract. Yes No
If not, what do you believe must change and why? _____

- B. Identify critical materials, deliveries, long lead items and other dependencies, including Owner Furnished items that could affect the completion of your work. Yes No
1. _____
 2. _____
 3. _____
 4. _____
 5. _____

- C. Do you understand that there is going to be maintenance and other construction taking place on site during the course of the project? Yes No

VII. EXECUTION OF WORK

- A. Do you understand the access to the site? Yes No
- B. Do you understand the staging area restrictions? Yes No
- C. Have you included protection of [asphalt, floors, and roofs]? Yes No
- D. Do you understand that the site is occupied by students, teachers, administrators, parents, etc.? Yes No

VIII. CONTRACTOR COMMENTS/SUGGESTIONS:

1. _____
2. _____
3. _____
4. _____

5.

IX. CONTRACTOR

You agree the information contained herein is part of your contractual obligations. Your signature acknowledges your agreement to perform all Work in the Contract Documents, and that costs for all Work are included in your bid.

The foregoing information is true and accurate, and I am authorized to sign as an officer of the company I am representing.

[Company Name]

Signature _____ Title: _____

Date: _____

X. CONSTRUCTION MANAGER

Signature _____ Title: _____

Date: _____

Title of Document: POST BID INTERVIEW

Number of Pages: _____

Date of Document: _____

END OF DOCUMENT

06/06/18

DOCUMENT 00 51 00

NOTICE OF AWARD

Dated: _____ 20__

To: _____ (Contractor)

To: _____
(Address)

From: Governing Board ("Board") of the San Rafael City Schools ("District" or "Owner")

PROJECT: Terra Linda High School – Innovation Hub, Project No. _____ ("Project").

Contractor has been awarded the referenced Contract on _____, 20__, by action of the District's Board and Notice of Award Signed by Dan Zaich, Senior Director Capital Facilities.

The Contract Price is _____ Dollars (\$ _____),
and includes Alternates _____.

Three (3) copies of each of the Contract Documents (except Drawings) accompany this Notice of Award. Three (3) sets of the Drawings will be delivered separately or otherwise made available. Additional copies are available at cost of reproduction.

You must comply with the following conditions precedent within SEVEN (7) calendar days of the date of this Notice of Award.

The Contractor shall execute and submit the following documents by 5:00 p.m. of the SEVENTH (7th) calendar day following the date of the Notice of Award.

- a. Agreement: To be executed by successful Bidder. Submit four (4) copies, each bearing an original signature.
- b. Escrow of Bid Documentation: This must include all required documentation. See the document titled Escrow Bid Documentation for more information.
- c. Performance Bond (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.
- d. Payment Bond (Contractor's Labor & Material Bond) (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.
- e. Insurance Certificates and Endorsements as required.
- f. Workers' Compensation Certification.
- g. Prevailing Wage and Related Labor Requirements Certification.
- h. Disabled Veteran Business Enterprise Participation Certification.
- i. Drug-Free Workplace Certification.
- j. Tobacco-Free Environment Certification.
- k. Hazardous Materials Certification.

- l. Lead-Based Materials Certification.
- m. Imported Materials Certification.
- n. Criminal Background Investigation/Fingerprinting Certification.
- o. Buy American Certification.
- p. Roofing Project Certification: from Contractor, Material Manufacturer and/or Vendor.
- q. Registered Subcontractors List: Must include Department of Industrial Relations (DIR) registration number of each subcontractor for all tiers.

Failure to comply with these conditions within the time specified will entitle District to consider your bid abandoned, to annul this Notice of Award, and to declare your Bid Security forfeited, as well as any other rights the District may have against the Contractor.

After you comply with those conditions, District will return to you one fully signed counterpart of the Agreement.

SAN RAFAEL CITY SCHOOLS

BY: _____

NAME: _____

TITLE: _____

END OF DOCUMENT

06/06/18

AGREEMENT

THIS AGREEMENT IS MADE AND ENTERED INTO THIS _____ DAY OF _____, 20____, by and between the San Rafael City Schools ("District") and _____ ("Contractor") ("Agreement").

WITNESSETH: That the parties hereto have mutually covenanted and agreed, and by these presents do covenant and agree with each other, as follows:

1. **The Work:** Contractor agrees to furnish all tools, equipment, apparatus, facilities, labor, and material necessary to perform and complete in a good and workmanlike manner, the work of the following project:

Terra Linda High School - Innovation Hub

("Project" or "Contract" or "Work")

It is understood and agreed that the Work shall be performed and completed as required in the Contract Documents including, without limitation, the Drawings and Specifications and submission of all documents required to secure funding or by the Division of the State Architect for close-out of the Project, under the direction and supervision of, and subject to the approval of, the District or its authorized representative.

2. **The Contract Documents:** The complete Contract consists of all Contract Documents as defined in the General Conditions and incorporated herein by this reference. Any and all obligations of the District and Contractor are fully set forth and described in the Contract Documents. All Contract Documents are intended to cooperate so that any Work called for in one and not mentioned in the other or vice versa is to be executed the same as if mentioned in all Contract Documents.
3. **Interpretation of Contract Documents:** Should any question arise concerning the intent or meaning of Contract Documents, including the Drawings or Specifications, the question shall be submitted to the District for interpretation. If a conflict exists in the Contract Documents, valid, written modifications, beginning with the most recent, shall control over this Agreement (if any), which shall control over the Special Conditions, which shall control over any Supplemental Conditions, which shall control over the General Conditions, which shall control over the remaining Division 0 documents, which shall control over Division 1 Documents which shall control over Division 2 through Division 49 documents, which shall control over figured dimensions, which shall control over large-scale drawings, which shall control over small-scale drawings. In no case shall a document calling for lower quality and/or quantity material or workmanship control. The decision of the District in the matter shall be final.
4. **Time for Completion:** It is hereby understood and agreed that the Work under this Contract shall be completed within Two hundred ten (210) consecutive calendar days ("Contract Time") from the date specified in the District's Notice to Proceed.
5. **Completion - Extension of Time:** Should the Contractor fail to complete this Contract, and the Work provided herein, within the time fixed for completion, due allowance being made for the contingencies provided for herein, the Contractor shall become liable to the District for all loss and damage that the District may suffer on account thereof. The Contractor shall coordinate its Work with the Work of all other contractors. The District shall not be liable for delays resulting from Contractor's failure to coordinate its Work with other contractors in a manner that will allow timely completion of Contractor's Work. Contractor shall be liable for delays to other contractors caused by Contractor's failure to coordinate its Work with the Work of other contractors.

6. **Liquidated Damages:** Time is of the essence for all work under this Agreement. It is hereby understood and agreed that it is and will be difficult and/or impossible to ascertain and determine the actual damage that the District will sustain in the event of and by reason of Contractor's delay; therefore, Contractor agrees that it shall pay to the District the sum of Two Thousand dollars (\$2,000.00) per day as liquidated damages for each and every day's delay beyond the time herein prescribed in finishing the Work.

It is hereby understood and agreed that this amount is not a penalty.

In the event that any portion of the liquidated damages is not paid to the District, the District may deduct that amount from any money due or that may become due the Contractor under this Agreement, and such deduction does not constitute a withholding or penalty. The District's right to assess liquidated damages is as indicated herein and in the General Conditions.

The time during which the Contract is delayed for cause, as hereinafter specified, may extend the time of completion for a reasonable time as the District may grant, provided that Contractor has complied with the claims procedure of the Contract Documents. This provision does not exclude the recovery of damages by either party under other provisions in the Contract Documents.

7. **Loss Or Damage:** The District and its agents and authorized representatives shall not in any way or manner be answerable or suffer loss, damage, expense, or liability for any loss or damage that may happen to the Work, or any part thereof, or in or about the same during its construction and before acceptance, and the Contractor shall assume all liabilities of every kind or nature arising from the Work, either by accident, negligence, theft, vandalism, or any cause whatsoever; and shall hold the District and its agents and authorized representatives harmless from all liability of every kind and nature arising from accident, negligence, or any cause whatsoever.
8. **Insurance and Bonds:** Prior to issuance of the Notice to Proceed by the District, Contractor shall provide all required certificates of insurance, insurance endorsements, and payment and performance bonds as evidence thereof.
9. **Prosecution of Work:** If the Contractor should neglect to prosecute the Work properly or fail to perform any provisions of this Contract, the District, may, pursuant to the General Conditions and without prejudice to any other remedy it may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor.
10. **Authority of Architect, Project Inspector, and DSA:** Contractor hereby acknowledges that the Architect(s), the Project Inspector(s), and the Division of the State Architect ("DSA") have authority to approve and/or suspend Work if the Contractor's Work does not comply with the requirements of the Contract Documents, Title 24 of the California Code of Regulations, and all applicable laws and regulations. The Contractor shall be liable for any delay caused by its non-compliant Work.
11. **Assignment of Contract:** Neither the Contract, nor any part thereof, nor any moneys due or to become due thereunder, may be assigned by the Contractor without the prior written approval of the District, nor without the written consent of the Surety on the Contractor's Performance Bond (the "Surety"), unless the Surety has waived in writing its right to notice of assignment.
12. **Classification of Contractor's License:** Contractor hereby acknowledges that it currently holds valid Type B Contractor's license(s) issued by the State of California, Contractors' State License Board, in accordance with division 3, chapter 9, of the Business and Professions Code and in the classification called for in the Contract Documents. Subcontractors shall hold valid licenses as required per CSLB.

13. **Registration as Public Works Contractor:** The Contractor and all Subcontractors currently are registered as public works contractors with the Department of Industrial Relations, State of California, in accordance with Labor Code section 1771.1.
14. **Payment of Prevailing Wages:** The Contractor and all Subcontractors shall pay all workers on all Work performed pursuant to this Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the District, pursuant to sections 1770 et seq. of the California Labor Code.
15. This Project is subject to labor compliance monitoring and enforcement by the Department of Industrial Relations pursuant to Labor Code section 1771.4 and Title 8 of the California Code of Regulations. Contractor specifically acknowledges and understands that it shall perform the Work of this Agreement while complying with all the applicable provisions of Division 2, Part 7, Chapter 1, of the Labor Code, including, without limitation, the requirement that the Contractor and all of its Subcontractors shall timely submit complete and accurate electronic certified payroll records as required by the Contract Documents, or the District may not issue payment.
16. **Contract Price:** In consideration of the foregoing covenants, promises, and agreements on the part of the Contractor, and the strict and literal fulfillment of each and every covenant, promise, and agreement, and as compensation agreed upon for the Work and construction, erection, and completion as aforesaid, the District covenants, promises, and agrees that it will well and truly pay and cause to be paid to the Contractor in full, and as the full Contract Price and compensation for construction, erection, and completion of the Work hereinabove agreed to be performed by the Contractor, the following price:

_____ Dollars
(\$ _____),

in lawful money of the United States, which sum is to be paid according to the schedule provided by the Contractor and accepted by the District and subject to additions and deductions as provided in the Contract. This amount supersedes any previously stated and/or agreed to amount(s).

17. **No Representations:** No representations have been made other than as set forth in writing in the Contract Documents, including this Agreement. Each of the Parties to this Agreement warrants that it has carefully read and understood the terms and conditions of this Agreement and all Contract Documents, and that it has not relied upon the representations or advice of any other Party or any attorney not its own.
18. **Entire Agreement:** The Contract Documents, including this Agreement, set forth the entire agreement between the parties hereto and fully supersede any and all prior agreements, understandings, written or oral, between the parties hereto pertaining to the subject matter thereof.
19. **Severability:** If any term, covenant, condition, or provision in any of the Contract Documents is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remainder of the provisions in the Contract Documents shall remain in full force and effect and shall in no way be affected, impaired, or invalidated thereby.

IN WITNESS WHEREOF, accepted and agreed on the date indicated above:

CONTRACTOR

SAN RAFAEL CITY SCHOOLS

By: _____

By: _____

Title: _____

Title: _____

NOTE: If the party executing this Contract is a corporation, a certified copy of the by-laws, or of the resolution of the Board of Directors, authorizing the officers of said corporation to execute the Contract and the bonds required thereby must be attached hereto.

END OF DOCUMENT

06/06/18

DOCUMENT 00 55 00

NOTICE TO PROCEED

Dated: _____, 20__

TO: _____
("Contractor")

ADDRESS: _____

PROJECT: Terra Linda High School - Innovation Hub

PROJECT/CONTRACT NO.: _____ between the San Rafael City Schools and Contractor ("Contract").

You are notified that the Contract Time under the above Contract will commence to run on _____, 20__. By that date, you are to start performing your obligations under the Contract Documents. In accordance with the Agreement executed by Contractor, the date of completion is [TBD.][A1]

You must submit the following documents by 5:00 p.m. of the TENTH (10th) calendar day following the date of this Notice to Proceed:

- a. Contractor's preliminary schedule of construction.
- b. Contractor's preliminary schedule of values for all of the Work.
- c. Contractor's preliminary schedule of submittals, including Shop Drawings, Product Data, and Samples submittals
- d. Contractor's Safety Plan specifically adapted for the Project.
- e. A complete subcontractors list, including the name, address, telephone number, email address, facsimile number, California State Contractors License number, license classification, Department of Industrial Relations registration number, and monetary value of all Subcontracts.

Thank you. We look forward to a very successful Project.

SAN RAFAEL CITY SCHOOLS

BY: _____

NAME: _____

TITLE: _____

END OF DOCUMENT

06/06/18

ESCROW BID DOCUMENTATION

1. REQUIREMENT TO ESCROW BID DOCUMENTATION

- a. Contractor shall submit, within SEVEN (7) calendar days after the date of the Notice of Award, one copy of all documentary information received or generated by Contractor in preparation of bid prices for this Contract, as specified herein. This material is referred to herein as "Escrow Bid Documentation." The Escrow Bid Documentation of the Contractor will be held in escrow for the duration of the Contract.
- b. Contractor agrees, as a condition of award of the Contract, that the Escrow Bid Documentation constitutes all written information used in the preparation of its bid, and that no other written bid preparation information shall be considered in resolving disputes or claims. Contractor also agrees that nothing in the Escrow Bid Documentation shall change or modify the terms or conditions of the Contract Documents.
- c. The Escrow Bid Documentation will not be opened by District except as indicated herein. The Escrow Bid Documentation will be used only for the resolution of change orders and claims disputes.
- d. Contractor's submission of the Escrow Bid Documentation, as with the bonds and insurance documents required, is considered an essential part of the Contract award. Should the Contractor fail to make the submission within the allowed time specified above, District may deem the Contractor to have failed to enter into the Contract, and the Contractor shall forfeit the amount of its bid security, accompanying the Contractor's bid, and District may award the Contract to the next lowest responsive responsible bidder.
- e. NO PAYMENTS WILL BE MADE, NOR WILL DISTRICT ACCEPT PROPOSED CHANGE ORDERS UNTIL THE ABOVE REQUIRED INFORMATION IS SUBMITTED AND APPROVED.
- f. The Escrow Bid Documentation shall be submitted in person by an authorized representative of the Contractor to the District.

2. OWNERSHIP OF ESCROW BID DOCUMENTATION

- a. The Escrow Bid Documentation is, and shall always remain, the property of Contractor, subject to review by District, as provided herein.
- b. Escrow Bid Documentation constitute trade secrets, not known outside Contractor's business, known only to a limited extent and only by a limited number of employees of Contractor, safeguarded while in Contractor's possession, extremely valuable to Contractor, and could be extremely valuable to Contractor's competitors by virtue of it reflecting Contractor's contemplated techniques of construction. Subject to the provisions herein, District agrees to safeguard the Escrow Bid Documentation, and all information contained therein, against disclosure to the fullest extent permitted by law.

3. FORMAT AND CONTENTS OF ESCROW BID DOCUMENTATION

- a. Contractor may submit Escrow Bid Documentation in its usual cost-estimating format; a standard format is not required. The Escrow Bid Documentation shall be submitted in the language (e.g., English) of the specification.

- b. Escrow Bid Documentation must clearly itemize the estimated costs of performing the work of each bid item contained in the bid schedule, separating bid items into sub-items as required to present a detailed cost estimate and allow a detailed cost review. The Escrow Bid Documentation shall include all subcontractor bids or quotes, supplier bids or quotes, quantity takeoffs, crews, equipment, calculations of rates of production and progress, copies of quotes from subcontractors and suppliers, and memoranda, narratives, add/deduct sheets, and all other information used by the Contractor to arrive at the prices contained in the bid proposal. Estimated costs should be broken down into Contractor's usual estimate categories such as direct labor, repair labor, equipment ownership and operation, expendable materials, permanent materials, and subcontract costs as appropriate. Plant and equipment and indirect costs should be detailed in the Contractor's usual format. The Contractor's allocation of indirect costs, contingencies, markup, and other items to each bid item shall be identified.
- c. All costs shall be identified. For bid items amounting to less than \$10,000, estimated unit costs are acceptable without a detailed cost estimate, provided that labor, equipment, materials, and subcontracts, as applicable, are included and provided that indirect costs, contingencies, and markup, as applicable, are allocated.
- d. Bid Documentation provided by District should not be included in the Escrow Bid Documentation unless needed to comply with the following requirements.

4. SUBMITTAL OF ESCROW BID DOCUMENTATION

- a. The Escrow Bid Documentation shall be submitted by the Contractor in a sealed container within **SEVEN (7)** calendar days after the date of the Notice of Award. The container shall be clearly marked on the outside with the Contractor's name, date of submittal, project name and the words "Escrow Bid Documentation – Intended to be opened in the presence of Authorized Representatives of Both District and Contractor".
- b. By submitting Escrow Bid Documentation, Contractor represents that the material in the Escrow Bid Documentation constitutes all the documentary information used in preparation of the bid and that the Contractor has personally examined the contents of the Escrow Bid Documentation container and has found that the documents in the container are complete.
- c. If Contractor's proposal is based upon subcontracting any part of the work, each subcontractor whose total subcontract price exceeds 5 percent of the total contract price proposed by Contractor, shall provide separate Escrow Documents to be included with those of Contractor. Those documents shall be opened and examined in the same manner and at the same time as the examination described above for Contractor.
- d. If Contractor wishes to subcontract any portion of the Work after award, District retains the right to require Contractor to submit Escrow Documents for the Subcontractor before the subcontract is approved.

5. STORAGE, EXAMINATION AND FINAL DISPOSITION OF ESCROW BID DOCUMENTATION

- a. The Escrow Bid Documentation will be placed in escrow, for the life of the Contract, in a mutually agreeable institution. The cost of storage will be paid by Contractor for the duration of the project until final Contract payment. The storage facilities shall be the appropriate size for all the Escrow Bid Documentation and located conveniently to both District's and Contractor's offices.

- b. The Escrow Bid Documentation shall be examined by both District and Contractor, at any time deemed necessary by either District or Contractor, to assist in the negotiation of price adjustments and change orders or the settlement of disputes and claims. In the case of legal proceedings, Escrow Bid Documentation shall be used subject to the terms of an appropriate protective order if requested by Contractor and ordered by a court of competent jurisdiction. Examination of the Escrow Bid Documentation is subject to the following conditions:
- (1) As trade secrets, the Escrow Bid Documentation is proprietary and confidential to the extent allowed by law.
 - (2) District and Contractor shall each designate, in writing to the other party **SEVEN (7)** calendar days prior to any examination, the names of representatives who are authorized to examine the Escrow Bid Documentation. No other person shall have access to the Escrow Bid Documentation.
 - (3) Access to the documents may take place only in the presence of duly designated representatives of the District and Contractor. If Contractor fails to designate a representative or appear for joint examination on **SEVEN (7)** calendar days notice, then the District representative may examine the Escrow Bid Documents alone upon an additional **THREE (3)** calendar days notice if a representative of the Contractor does not appear at the time set.
 - (4) If a subcontractor has submitted sealed information to be included in the Escrow Bid Documents, access to those documents may take place only in the presence of a duly designated representative of the District, Contractor and that subcontractor. If that subcontractor fails to designate a representative or appear for joint examination on **SEVEN (7)** calendar days notice, then the District representative and/or the Contractor may examine the Escrow Bid Documentation without that subcontractor present upon an additional **THREE (3)** calendar days notice if a representative of that subcontractor does not appear at the time set.
- c. The Escrow Bid Documentation will be returned to Contractor at such time as the Contract has been completed and final settlement has been achieved.

END OF DOCUMENT

06/06/18

**ESCROW AGREEMENT IN LIEU OF RETENTION
(Public Contract Code Section 22300)**

(Note: Contractor must use this form.)

This Escrow Agreement ("Escrow Agreement") is made and entered into this _____ day of _____, 20____, by and between the San Rafael City Schools ("District"), whose address is 310 Nova Albion Way, San Rafael, California 94903, and _____ ("Contractor"), whose address is _____, and _____ ("Escrow Agent"), a state or federally chartered bank in the state of California, whose address is _____

For the consideration hereinafter set forth, District, Contractor, and Escrow Agent agree as follows:

1. Pursuant to section 22300 of Public Contract Code of the State of California, which is hereby incorporated by reference, Contractor has the following two (2) options:
 - ☐ Deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by District pursuant to the Construction Contract No.____ entered into between District and Contractor for the Glenwood Elementary School – Multipurpose Building Project, in the amount of _____ Dollars (\$_____) dated, _____, 20____, (the "Contract"); or
 - ☐ On written request of Contractor, District shall make payments of the retention earnings for the above referenced Contract directly to Escrow Agent.

When Contractor deposits the securities as a substitute for Contract earnings (first option), Escrow Agent shall notify District within ten (10) calendar days of the deposit. The market value of the securities at the time of substitution and at all times from substitution until the termination of the Escrow Agreement shall be at least equal to the cash amount then required to be withheld as retention under terms of Contract between District and Contractor.

Securities shall be held in the name of San Rafael City Schools School District, and shall designate Contractor as beneficial owner.

2. District shall make progress payments to Contractor for those funds which otherwise would be withheld from progress payments pursuant to Contract provisions, provided that Escrow Agent holds securities in form and amount specified above.
3. When District makes payment of retention earned directly to Escrow Agent, Escrow Agent shall hold them for the benefit of Contractor until the time that the escrow created under this Escrow Agreement is terminated. Contractor may direct the investment of the payments into securities. All terms and conditions of this Escrow Agreement and the rights and responsibilities of the Parties shall be equally applicable and binding when District pays Escrow Agent directly.
4. Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account, and all expenses of District. The District will charge Contractor \$_____ for each of District's deposits to the escrow account. These expenses and payment terms shall be determined by District, Contractor, and Escrow Agent.

5. Interest earned on securities or money market accounts held in escrow and all interest earned on that interest shall be for sole account of Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to District.
6. Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from District to Escrow Agent that District consents to withdrawal of amount sought to be withdrawn by Contractor.
7. District shall have the right to draw upon the securities and/or withdraw amounts from the Escrow Account in the event of default by Contractor. Upon seven (7) days' written notice to Escrow Agent from District of the default, if applicable, Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by District.
8. Upon receipt of written notification from District certifying that the Contract is final and complete, and that Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all monies and securities on deposit and payments of fees and charges.
9. Escrow Agent shall rely on written notifications from District and Contractor pursuant to Paragraphs 5 through 8, inclusive, of this Escrow Agreement and District and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of securities and interest as set forth above.
10. Names of persons who are authorized to give written notice or to receive written notice on behalf of District and on behalf of Contractor in connection with the foregoing, and exemplars of their respective signatures are as follows:

On behalf of District:

Title

Name

Signature

Address

On behalf of Contractor:

Title

Name

Signature

Address

On behalf of Escrow Agent:

Title

Name

Signature

Address

At the time that the Escrow Account is opened, District and Contractor shall deliver to Escrow Agent a fully executed copy of this Agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement by their proper officers on the date first set forth above.

On behalf of District:

On behalf of Contractor:

Title

Title

Name

Name

Signature

Signature

Address

Address

END OF DOCUMENT

06/06/18

**PERFORMANCE BOND
(100% of Contract Price)**

(Note: Contractor must use this form, NOT a surety company form.)

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, the governing board ("Board") of the San Rafael City Schools, ("District") and _____ ("Principal") have entered into a contract for the furnishing of all materials and labor, services and transportation, necessary, convenient, and proper to perform the following project:

Terra Linda High School - Innovation Hub

("Project" or "Contract") which Contract dated _____, 20____, and all of the Contract Documents attached to or forming a part of the Contract, are hereby referred to and made a part hereof; and

WHEREAS, said Principal is required under the terms of the Contract to furnish a bond for the faithful performance of the Contract.

NOW, THEREFORE, the Principal and _____ ("Surety") are held and firmly bound unto the Board of the District in the penal sum of

_____ Dollars (\$ _____), lawful money of the United States, for the payment of which sum well and truly to be made we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally, firmly by these presents, to:

- Promptly perform all the work required to complete the Project; and
- Pay to the District all damages the District incurs as a result of the Principal's failure to perform all the Work required to complete the Project.

Or, at the District's sole discretion and election, the Surety shall obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by the District of the lowest responsible bidder, arrange for a contract between such bidder and the District and make available as Work progresses sufficient funds to pay the cost of completion less the "balance of the Contract Price," and to pay and perform all obligations of Principals under the Contract, including, without limitation, all obligations with respect to warranties, guarantees and the payment of liquidated damages. The term "balance of the Contract Price," as used in this paragraph, shall mean the total amount payable to Principal by the District under the Contract and any modifications thereto, less the amount previously paid by the District to the Principal, less any withholdings by the District allowed under the Contract. District shall not be required or obligated to accept a tender of a completion contractor from the Surety for any or no reason.

The condition of the obligation is such that, if the above bound Principal, its heirs, executors, administrators, successors, or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions, and agreements in the Contract and any alteration thereof made as therein provided, on its part to be kept and performed at the time and in the intent and meaning, including all contractual guarantees and warranties of materials and workmanship, and shall indemnify and save harmless the District, its trustees, officers and agents, as therein stipulated, then this obligation shall become null and void, otherwise it shall be and remain in full force and virtue.

Surety expressly agrees that the District may reject any contractor or subcontractor proposed by Surety to fulfill its obligations in the event of default by the Principal. Surety shall not utilize Principal in completing the Work nor shall Surety accept a Bid from Principal for completion of the Work if the District declares the Principal to be in default and notifies Surety of the District's objection to Principal's further participation in the completion of the Work.

As a condition precedent to the satisfactory completion of the Contract, the above obligation shall hold good for a period equal to the warranty and/or guarantee period of the Contract, during which time Surety's obligation shall continue if Contractor shall fail to make full, complete, and satisfactory repair and replacements and totally protect the District from loss or damage resulting from or caused by defective materials or faulty workmanship. The obligations of Surety hereunder shall continue so long as any obligation of Contractor remains. Nothing herein shall limit the District's rights or the Contractor or Surety's obligations under the Contract, law or equity, including, but not limited to, California Code of Civil Procedure section 337.15.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond. The Surety also stipulates and agrees that it shall not be exonerated or released from the obligation of this bond by any overpayment or underpayment by the District that is based upon estimates approved by the Architect. The Surety does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract or to the work or to the specifications.

IN WITNESS WHEREOF, two (2) identical counterparts of this instrument, each of which shall for all purposes be deemed an original thereof, have been duly executed by the Principal and Surety above named, on the _____ day of _____, 20____.

Principal

Surety

By

By

Name of California Agent of Surety

Address of California Agent of Surety

Telephone No. of California Agent of Surety

Contractor must attach a Notarial Acknowledgment for all Surety's signatures and a Power of Attorney and Certificate of Authority for Surety. The California Department of Insurance must authorize the Surety to be an admitted surety insurer.

END OF DOCUMENT

06/06/18

PAYMENT BOND
Contractor's Labor & Material Bond
(100% Of Contract Price)

(Note: Contractor must use this form, NOT a surety company form.)

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, the governing board ("Board") of the San Rafael City Schools, ("District") and _____, ("Principal") have entered into a contract for the furnishing of all materials and labor, services and transportation, necessary, convenient, and proper to perform the following project:

Terra Linda High School - Innovation Hub

("Project" or "Contract") which Contract dated _____, 20____, and all of the Contract Documents attached to or forming a part of the Contract, are hereby referred to and made a part hereof; and

WHEREAS, pursuant to law and the Contract, the Principal is required, before entering upon the performance of the work, to file a good and sufficient bond with the body by which the Contract is awarded in an amount equal to one hundred percent (100%) of the Contract price, to secure the claims to which reference is made in sections 9000 through 9510 and 9550 through 9566 of the Civil Code, and division 2, part 7, of the Labor Code.

NOW, THEREFORE, the Principal and _____ ("Surety") are held and firmly bound unto all laborers, material men, and other persons referred to in said statutes in the sum of _____ Dollars (\$ _____), lawful money of the United States, being a sum not less than the total amount payable by the terms of Contract, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, or assigns, jointly and severally, by these presents.

The condition of this obligation is that if the Principal or any of its subcontractors, or their heirs, executors, administrators, successors, or assigns of any, all, or either of them shall fail to pay for any labor, materials, provisions, or other supplies, used in, upon, for or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or for amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of the Principal or any of his or its subcontractors of any tier under Section 13020 of the Unemployment Insurance Code with respect to such work or labor, that the Surety will pay the same in an amount not exceeding the amount herein above set forth, and also in case suit is brought upon this bond, will pay a reasonable attorney's fee to be awarded and fixed by the court, and to be taxed as costs and to be included in the judgment therein rendered.

It is hereby expressly stipulated and agreed that this bond shall inure to the benefit of any and all persons, companies, and corporations entitled to file claims under section 9100 of the Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

Should the condition of this bond be fully performed, then this obligation shall become null and void; otherwise it shall be and remain in full force and affect.

And the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of Contract or the specifications accompanying the same shall in any manner affect its obligations on this bond, and it does hereby waive notice of any such change, extension, alteration, or addition.

IN WITNESS WHEREOF, two (2) identical counterparts of this instrument, each of which shall for all purposes be deemed an original thereof, have been duly executed by the Principal and Surety above named, on the _____ day of _____, 20____.

Principal	Surety
By	By
	_____ Name of California Agent of Surety
	_____ Address of California Agent of Surety
	_____ Telephone No. of California Agent of Surety

Contractor must attach a Notarial Acknowledgment for all Surety's signatures and a Power of Attorney and Certificate of Authority for Surety. The California Department of Insurance must authorize the Surety to be an admitted surety insurer.

END OF DOCUMENT

06/06/18

ALLOWANCE EXPENDITURE DIRECTIVE FORM

San Rafael City Schools
310 Nova Albion Way
San Rafael, CA 94903

**ALLOWANCE EXPENDITURE
DIRECTIVE NO.:**

ALLOWANCE EXPENDITURE DIRECTIVE

Project: Terra Linda High School - Innovation Hub

Date: _____

DSA File No.: 21-39

Bid No.: _____

DSA Appl. No. 01- _____

The following parties agree to the terms of this Allowance Expenditure Directive ("AED"):

Owner Name, Address, Telephone:

Contractor Name, Address, Telephone:

Reference	Description	Allowance Authorized for Expenditure	Days Ext.
Request for AED # Requested by: Performed by: Reason:	[Description of unforeseen item relating to Work] [Requester] [Performer] [Reason]	\$	
Request for AED # Requested by: Performed by: Reason:	[Description of unforeseen item relating to Work] [Requester] [Performer] [Reason]	\$	
Request for AED # Requested by: Performed by: Reason:	[Description of unforeseen item relating to Work] [Requester] [Performer] [Reason]	\$	

Contract time will be adjusted as follows:	Total Contract Allowance Amount:	\$
Previous Completion Date: <u> [DATE] </u>	Amount of Previously Approved Allowance Expenditure Directive(s):	\$
<u> [#] </u> Calendar Days Extension (zero days unless otherwise indicated)	Amount of this Allowance Expenditure Directive:	\$
Current Completion Date: <u> [DATE] </u>		

The undersigned Contractor approves the foregoing release of allowance for completion of each specified item, and as to the extension of time allowed, if any, for completion of the entire work as stated therein, and agrees to furnish all labor, materials and services and perform all work necessary to complete any additional work specified for the consideration stated therein ("Work"). Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650, et seq.

This Allowance Expenditure Directive must be signed by an authorized District representative.

It is expressly understood that the authorized allowance expenditure and time, if any, granted herein represent a full accord and satisfaction for any and all time and cost impacts of the items herein, and Contractor waives any and all further compensation or time extension based on the items herein. The value of the extra work or changes expressly includes any and all of the Contractor's costs and expenses, and its subcontractors, both direct and indirect, resulting from additional time required on the project or resulting from delay to the project. Any costs, expenses, damages or time extensions not included are deemed waived.

Signatures:

DISTRICT: _____ SCHOOL DISTRICT Date: _____ By: _____ [Print Name and Title here]	CONTRACTOR: _____ Date: _____ By: _____ [Print Name and Title here]
ARCHITECT: _____ Date: _____ By: _____ [Print Name and Title here]	PROJECT INSPECTOR: _____ Date: _____ By: _____ [Print Name and Title here]

END OF DOCUMENT

06/06/18

PROPOSED CHANGE ORDER FORM

San Rafael City Schools
310 Nova Albion Way
San Rafael, CA 94903

PCO NO.:

Project: Terra Linda High School - Innovation Hub
Bid No.:
RFI #:

Date:
DSA File No.: 21-39
DSA Appl. No.: 01-117586

Contractor hereby submits for District's review and evaluation this Proposed Change Order ("PCO"), submitted in accordance with and subject to the terms of the Contract Documents, including Sections 17.7 and 17.8 of the General Conditions. Any spaces left blank below are deemed no change to cost or time.

Contractor understands and acknowledges that documentation supporting Contractor's PCO must be attached and included for District review and evaluation. Contractor further understands and acknowledges that failure to include documentation sufficient to, in District's discretion, support some or all of the PCO, shall result in a rejected PCO.

	WORK PERFORMED OTHER THAN BY CONTRACTOR	ADD	DEDUCT
(a)	Material (attach suppliers' invoice or itemized quantity and unit cost plus sales tax)		
(b)	Add Labor (attach itemized hours and rates, fully encumbered)		
(c)	Add Equipment (attach suppliers' invoice)		
(d)	Subtotal		
(e)	Add overhead and profit for any and all tiers of Subcontractor , the total not to exceed ten percent (10%) of Item (d)		
(f)	Subtotal		
(g)	Add Overhead and Profit for Contractor , not to exceed five percent (5%) of Item (f)		
(h)	Subtotal		
(i)	Add Bond and Insurance , not to exceed one and a half percent (1.5%) of Item (h)		
(j)	TOTAL		
(k)	Time (zero unless indicated; "TBD" not permitted)		Calendar Days

[REMAINDER OF PAGE LEFT BLANK INTENTIONALLY]

	WORK PERFORMED BY CONTRACTOR	ADD	DEDUCT
(a)	Material (attach itemized quantity and unit cost plus sales tax)		
(b)	Add Labor (attach itemized hours and rates, fully encumbered)		
(c)	Add Equipment (attach suppliers' invoice)		
(d)	Subtotal		
(e)	Add Overhead and Profit for Contractor , not to exceed fifteen percent (15%) of Item (d)		
(f)	Subtotal		
(g)	Add Bond and Insurance , not to exceed one and a half percent (1.5%) of Item (f)		
(h)	TOTAL		
(i)	Time (zero unless indicated; "TBD" not permitted)		Calendar Days

The undersigned Contractor approves the foregoing as to the changes, if any, to the Contract Price specified for each item, and as to the extension of time allowed, if any, for completion of the entire Work as stated herein, and agrees to furnish all labor, materials, and service, and perform all work necessary to complete any additional work specified for the consideration stated herein. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 *et seq.* It is understood that the changes herein to the Contract shall only be effective when approved by the governing board of the District.

It is expressly understood that the value of the extra Work or changes expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from additional time required on the Project or resulting from delay to the Project. Contractor is not entitled to separately recover amounts for overhead or other indirect costs. Any costs, expenses, damages, or time extensions not included are deemed waived.

SUBMITTED BY:

Contractor:

[Name]

Date

END OF DOCUMENT

06/06/18

CHANGE ORDER FORM

San Rafael City Schools
310 Nova Albion Way
San Rafael, CA 94903

CHANGE ORDER NO.:

CHANGE ORDER

Project: Terra Linda High School - Innovation Hub
Bid No.:

Date:
DSA File No.: 21-39
DSA Appl. No.: 01-117586

The following parties agree to the terms of this Change Order:

Owner:

[Name / Address]

Contractor:

[Name / Address]

Architect:

[Name / Address]

Project Inspector:

[Name / Address]

Reference	Description	Cost	Days Ext.
PCO # Requested by: Performed by: Reason:	[Description of change] [Requester] [Performer] [Reason]	\$	
PCO # Requested by: Performed by: Reason:	[Description of change] [Requester] [Performer] [Reason]	\$	
PCO # Requested by: Performed by: Reason:	[Description of change] [Requester] [Performer] [Reason]	\$	
Contract time will be adjusted as follows: Previous Completion Date: <u> [Date] </u> <u> [#] </u> Calendar Days Extension (zero unless otherwise indicated) Current Completion Date: <u> [Date] </u>		Original Contract Amount:	\$
		Amount of Previously Approved Change Order(s):	\$
		Amount of this Change Order:	\$
		Contract Amount:	\$

The undersigned Contractor approves the foregoing as to the changes, if any, to the Contract Price specified for each item, and as to the extension of time allowed, if any, for completion of the entire

work as stated therein, and agrees to furnish all labor, materials and services and perform all work necessary to complete any additional work specified for the consideration stated therein. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650, *et seq.*

This change order is subject to approval by the governing board of this District and must be signed by the District. Until such time as this change order is approved by the District's governing board and executed by a duly authorized District representative, this change order is not effective and not binding.

It is expressly understood that the compensation and time, if any, granted herein represent a full accord and satisfaction for any and all time and cost impacts of the items herein, and Contractor waives any and all further compensation or time extension based on the items herein. The value of the extra work or changes expressly includes any and all of the Contractor's costs and expenses, both direct and indirect, resulting from additional time required on the project or resulting from delay to the project. Any costs, expenses, damages or time extensions not included are deemed waived.

Signatures:

District:

Contractor:

[Name] Date

[Name] Date

Architect:

Project Inspector:

[Name] Date

[Name] Date

END OF DOCUMENT

06/06/18

AGREEMENT AND RELEASE OF ANY AND ALL CLAIMS

THIS AGREEMENT AND RELEASE OF CLAIMS ("Agreement and Release") IS MADE AND ENTERED INTO THIS _____ DAY OF _____, 20____ by and between the SAN RAFAEL CITY SCHOOLS ("District") and _____ ("Contractor"), whose place of business is _____.

RECITALS:

1. District and Contractor entered into PROJECT/CONTRACT NO.: _____ ("Contract" or "Project") in the County of _____, California.
2. The Work under the Contract was completed on _____, and a Notice of Completion was recorded with the County Recorder on _____ [A1].

NOW, THEREFORE, it is mutually agreed between District and Contractor as follows:

AGREEMENT AND RELEASE

3. Contractor will only be assessed liquidated damages as detailed below:

Original Contract Sum \$ _____

Modified Contract Sum \$ _____

Payment to Date \$ _____

Liquidated Damages \$ _____

Payment Due Contractor \$ _____

4. Subject to the provisions hereof, District shall forthwith pay to Contractor the undisputed sum of _____ Dollars (\$ _____) under the Contract, less any amounts represented by any notice to withhold funds on file with District as of the date of such payment.
5. Contractor acknowledges and hereby agrees that there are no unresolved or outstanding claims in dispute against District arising from the performance of work under the Contract, except for the claims described in Paragraph 6 and continuing obligations described in Paragraph 8. It is the intention of the parties in executing this Agreement and Release that this Agreement and Release shall be effective as a full, final and general release of all claims, demands, actions, causes of action, obligations, costs, expenses, damages, losses and liabilities of Contractor against District and all of its respective agents, employees, trustees, inspectors, assignees, consultants and transferees, except for any Disputed Claim that may be set forth in Paragraph 6 and the continuing obligations described in Paragraph 8 hereof.

6. The following claims are disputed (hereinafter, the "Disputed Claims") and are specifically excluded from the operation of this Agreement and Release:

<u>Claim No.</u>	<u>Description of Claim</u>	<u>Amount of Claim</u>	<u>Date Claim</u>
_____	_____	\$ _____	_____
_____	_____	\$ _____	_____
_____	_____	\$ _____	_____
_____	_____	\$ _____	_____

[If further space is required, attach additional sheets showing the required information.]

7. Consistent with California Public Contract Code section 7100, Contractor hereby agrees that, in consideration of the payment set forth in Paragraph 4 hereof, Contractor hereby releases and forever discharges District, all its agents, employees, inspectors, assignees, and transferees from any and all liability, claims, demands, actions, or causes of action of whatever kind or nature arising out of or in any way concerned with the Work under the Contract.
8. Guarantees and warranties for the Work, and any other continuing obligation of Contractor, shall remain in full force and effect as specified in the Contract Documents.
9. To the furthest extent permitted by California law, Contractor shall defend, indemnify, and hold harmless the District, its agents, representatives, officers, consultants, employees, trustees, and volunteers (the "indemnified parties") from any and all losses, liabilities, claims, suits, and actions of any kind, nature, and description, including, but not limited to, attorneys' fees and costs, directly or indirectly arising out of, connected with, or resulting from the performance of the Contract unless caused wholly by the sole negligence or willful misconduct of the District.
10. Contractor hereby waives the provisions of California Civil Code section 1542 which provides as follows:
- A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS WHICH THE CREDITOR DOES NOT KNOW OR SUSPECT TO EXIST IN HIS OR HER FAVOR AT THE TIME OF EXECUTING THE RELEASE, WHICH IF KNOWN BY HIM OR HER MUST HAVE MATERIALLY AFFECTED HIS OR HER SETTLEMENT WITH THE DEBTOR.
11. The provisions of this Agreement and Release are contractual in nature and not mere recitals and shall be considered independent and severable. If any such provision or any part thereof shall be at any time held invalid in whole or in part under any federal, state, county, municipal, or other law, ruling, or regulations, then such provision, or part thereof, shall remain in force and effect to the extent permitted by law, and the remaining provisions of this Agreement and Release shall also remain in full force and effect, and shall be enforceable.
12. All rights of District shall survive completion of the Work or termination of Contract, and execution of this Release.

*** CAUTION: THIS IS A RELEASE - READ BEFORE EXECUTING ***

SAN RAFAEL CITY SCHOOLS

Signature: _____

Print Name: _____

Title: _____

CONTRACTOR: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

06/06/18

DOCUMENT 00 65 36

GUARANTEE FORM

____ ("Contractor") hereby agrees that the _____
____ ("Work" of Contractor) which Contractor has installed for the San Rafael City Schools
("District") for the following project:

PROJECT: Terra Linda High School - Innovation Hub

("Project" or "Contract") has been performed in accordance with the requirements of the Contract Documents and that the Work as installed will fulfill the requirements of the Contract Documents.

The undersigned agrees to repair or replace any or all of such Work that may prove to be defective in workmanship or material together with any other adjacent Work that may be displaced in connection with such replacement within a period of _____ year(s) from the date of completion as defined in Public Contract Code section 7107, subdivision (c), ordinary wear and tear and unusual abuse or neglect excepted. The date of completion is _____, 20____.

In the event of the undersigned's failure to comply with the above-mentioned conditions within a reasonable period of time, as determined by the District, but not later than seven (7) days after being notified in writing by the District, the undersigned authorizes the District to proceed to have said defects repaired and made good at the expense of the undersigned. The undersigned shall pay the costs and charges therefor upon demand.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

Representatives to be contacted for service subject to terms of Contract:

Name: _____

Address: _____

Phone No.: _____

END OF DOCUMENT

06/06/18

TABLE OF CONTENTS

	<u>Page</u>
1. CONTRACT TERMS AND DEFINITIONS	1
1.1 Definitions	1
1.2 Laws Concerning the Contract.....	5
1.3 No Oral Agreements	6
1.4 No Assignment.....	6
1.5 Notice and Service Thereof	6
1.6 No Waiver	6
1.7 Substitutions for Specified Items.....	7
1.8 Materials and Work	7
2. [RESERVED]	8
3. ARCHITECT.....	8
4. CONSTRUCTION MANAGER.....	9
5. INSPECTOR, INSPECTIONS, AND TESTS	9
5.1 Project Inspector	9
5.2 Tests and Inspections	10
5.3 Costs for After Hours and/or Off Site Inspections.....	10
6. CONTRACTOR.....	10
6.1 Status of Contractor	10
6.2 Project Inspection Card(s)	11
6.3 Contractor's Supervision.....	11
6.4 Duty to Provide Fit Workers	12
6.5 Field Office	12
6.6 Purchase of Materials and Equipment.....	12
6.7 Documents on Work.....	12
6.8 Preservation of Records	13
6.9 Integration of Work.....	13

6.10	Notifications	14
6.11	Obtaining of Permits, Licenses and Registrations.....	14
6.12	Royalties and Patents.....	14
6.13	Work to Comply With Applicable Laws and Regulations	15
6.14	Safety/Protection of Persons and Property	16
6.15	Working Evenings and Weekends	18
6.16	Cleaning Up.....	18
7.	SUBCONTRACTORS	19
8.	OTHER CONTRACTS/CONTRACTORS.....	20
9.	DRAWINGS AND SPECIFICATIONS	20
10.	CONTRACTOR'S SUBMITTALS AND SCHEDULES.....	21
10.1	Schedule of Work, Schedule of Submittals, and Schedule of Values	21
10.2	Monthly Progress Schedule(s)	24
10.3	Material Safety Data Sheets (MSDS).....	24
11.	SITE ACCESS, CONDITIONS, AND REQUIREMENTS	24
11.1	Site Investigation	24
11.2	Soils Investigation Report.....	25
11.3	Access to Work.....	25
11.4	Layout and Field Engineering.....	25
11.5	Utilities	26
11.6	Sanitary Facilities	26
11.7	Surveys.....	26
11.8	Regional Notification Center.....	26
11.9	Existing Utility Lines.....	26
11.10	Notification.....	27
11.11	Hazardous Materials.....	27
11.12	No Signs	27
12.	TRENCHES	27
12.1	Trenches Greater Than Five Feet	27

12.2	Excavation Safety	27
12.3	No Tort Liability of District	27
12.4	No Excavation without Permits	27
12.5	Discovery of Hazardous Waste and/or Unusual Conditions	28
13.	INSURANCE AND BONDS	28
13.1	Insurance	28
13.2	Contract Security - Bonds	32
14.	WARRANTY/GUARANTEE/INDEMNITY	32
14.1	Warranty/Guarantee	32
14.2	Indemnity and Defense	33
15.	TIME	35
15.1	Notice to Proceed	35
15.2	Computation of Time / Adverse Weather	35
15.3	Hours of Work	36
15.4	Progress and Completion	36
15.5	Schedule	36
15.6	Expeditious Completion	36
16.	EXTENSIONS OF TIME – LIQUIDATED DAMAGES	37
16.1	Liquidated Damages	37
16.2	Excusable Delay	37
16.3	No Additional Compensation for Delays Within Contractor's Control	38
16.4	Float or Slack in the Schedule	38
17.	CHANGES IN THE WORK	38
17.1	No Changes Without Authorization	38
17.2	Architect Authority	39
17.3	Change Orders	39
17.4	Construction Change Directives	39
17.5	Force Account Directives	40
17.6	Price Request	40

17.7	Proposed Change Order	41
17.8	Format for Proposed Change Order.....	43
17.9	Change Order Certification.....	44
17.10	Determination of Change Order Cost.....	45
17.11	Deductive Change Orders	45
17.12	Addition or Deletion of Alternate Bid Item(s)	45
17.13	Discounts, Rebates, and Refunds	45
17.14	Accounting Records	46
17.15	Notice Required	46
17.16	Applicability to Subcontractors	46
17.17	Alteration to Change Order Language	46
17.18	Failure of Contractor to Execute Change Order.....	46
18.	REQUEST FOR INFORMATION	46
19.	PAYMENTS.....	47
19.1	Contract Price.....	47
19.2	Applications for Progress Payments	47
19.3	Progress Payments	49
19.4	Decisions to Withhold Payment.....	51
19.5	Subcontractor Payments	53
20.	COMPLETION OF THE WORK	53
20.1	Completion.....	53
20.2	Close-Out/Certification Procedures.....	54
20.3	Final Inspection	55
20.4	Costs of Multiple Inspections.....	56
20.5	Partial Occupancy or Use Prior to Completion.....	56
21.	FINAL PAYMENT AND RETENTION.....	56
21.1	Final Payment.....	56
21.2	Prerequisites for Final Payment	57
21.3	Retention	57

21.4	Substitution of Securities	58
22.	UNCOVERING OF WORK.....	58
23.	NONCONFORMING WORK AND CORRECTION OF WORK.....	58
23.1	Nonconforming Work	58
23.2	Correction of Work	58
23.3	District's Right to Perform Work.....	59
24.	TERMINATION AND SUSPENSION	59
24.1	District's Right to Terminate Contractor for Cause	59
24.2	Termination of Contractor for Convenience	62
24.3	Suspension of Work.....	62
25.	CLAIMS PROCESS	63
25.1	Performance during Claim Process	63
25.2	Definition of Claim	63
25.3	Claims Presentation.....	63
25.4	Claim Resolution pursuant to Public Contract Code section 9204	64
25.5	Subcontractor Pass-Through Claims.....	65
25.6	Government Code Claim Act Claim.....	66
25.7	Claim Resolution pursuant to Public Contract Code section 20104 et seq.	66
25.8	Claim Resolution Non-Applicability	67
25.9	Attorney's Fees	68
26.	STATE LABOR, WAGE & HOUR, APPRENTICE, AND RELATED PROVISIONS	68
26.1	Labor Compliance and Enforcement	68
26.2	Wage Rates, Travel, and Subsistence.....	68
26.3	Hours of Work	69
26.4	Payroll Records.....	70
26.5	[RESERVED]	71
26.6	Apprentices	71
26.7	Non-Discrimination	72
26.8	Labor First Aid.....	72

27.	[RESERVED].....	72
28.	MISCELLANEOUS	72
28.1	Assignment of Antitrust Actions.....	72
28.2	Excise Taxes	73
28.3	Taxes.....	73
28.4	Shipments.....	73
28.5	Compliance with Government Reporting Requirements	73

GENERAL CONDITIONS

1. CONTRACT TERMS AND DEFINITIONS

1.1 Definitions

Wherever used in the Contract Documents, the following terms shall have the meanings indicated, which shall be applicable to both the singular and plural thereof:

1.1.1 Adverse Weather: Shall be only weather that satisfies all of the following conditions: (1) unusually severe precipitation, sleet, snow, hail, or extreme temperature conditions in excess of the norm for the location and time of year it occurred based on the closest weather station data averaged over the past five years, (2) that is unanticipated and would cause unsafe work conditions and/or is unsuitable for scheduled work that should not be performed during inclement weather (i.e., exterior finishes), and (3) at the Project.

1.1.2 Allowance Expenditure Directive: Written authorization for expenditure of allowance, if any.

1.1.3 Approval, Approved, and/or Accepted: Written authorization, unless stated otherwise.

1.1.4 Architect (or "Design Professional in General Responsible Charge"): The individual, partnership, corporation, joint venture, or any combination thereof, named as Architect, who will have the rights and authority assigned to the Architect in the Contract Documents. The term Architect means the Design Professional in General Responsible Charge as defined in DSA PR 13-02 on this Project or the Architect's authorized representative.

1.1.5 As-Builts: Reproducible blue line prints of drawings to be prepared on a monthly basis pursuant to the Contract Documents, that reflect changes made during the performance of the Work, recording differences between the original design of the Work and the Work as constructed since the preceding monthly submittal. See **Record Drawings**.

1.1.6 Bidder: A contractor who intends to provide a proposal to the District to perform the Work of this Contract.

1.1.7 Change Order: A written order to the Contractor authorizing an addition to, deletion from, or revision in the Work, and/or authorizing an adjustment in the Contract Price or Contract Time.

1.1.8 Claim: A Dispute that remains unresolved at the conclusion of the all the applicable Dispute Resolution requirements provided herein.

1.1.9 Construction Change Directive: A written order prepared and issued by the District, the Construction Manager, and/or the Architect and signed by the District and the Architect, directing a change in the Work.

1.1.10 Construction Manager: The individual, partnership, corporation, joint venture, or any combination thereof, or its authorized representative, named as such by the District. If no Construction Manager is used on the Project that is the subject of this Contract, then all references to Construction Manager herein shall be read to refer to District.

1.1.11 Construction Schedule: The progress schedule of construction of the Project as provided by Contractor and approved by District.

1.1.12 Contract, Contract Documents: The Contract consists exclusively of the documents evidencing the agreement of the District and Contractor, identified as the Contract Documents. The Contract Documents consist of the following documents:

- 1.1.12.1 Notice to Bidders
- 1.1.12.2 Instructions to Bidders
- 1.1.12.3 Bid Form and Proposal
- 1.1.12.4 Bid Bond
- 1.1.12.5 Designated Subcontractors List
- 1.1.12.6 Site Visit Certification (if a site visit was required)
- 1.1.12.7 Non-Collusion Declaration
- 1.1.12.8 Notice of Award
- 1.1.12.9 Notice to Proceed
- 1.1.12.10 Agreement
- 1.1.12.11 Escrow of Bid Documentation
- 1.1.12.12 Escrow Agreement for Security Deposits in Lieu of Retention (if applicable)
- 1.1.12.13 Performance Bond
- 1.1.12.14 Payment Bond (Contractor's Labor & Material Bond)
- 1.1.12.15 General Conditions
- 1.1.12.16 Special Conditions (if applicable)
- 1.1.12.17 Project Labor Agreement (if applicable)
- 1.1.12.18 Hazardous Materials Procedures and Requirements
- 1.1.12.19 Workers' Compensation Certification
- 1.1.12.20 Prevailing Wage Certification
- 1.1.12.21 Disabled Veteran Business Enterprise Participation Certification (if applicable)
- 1.1.12.22 Drug-Free Workplace Certification (if applicable)
- 1.1.12.23 Tobacco-Free Environment Certification
- 1.1.12.24 Hazardous Materials Certification (if applicable)
- 1.1.12.25 Lead-Based Materials Certification (if applicable)
- 1.1.12.26 Imported Materials Certification (if applicable)
- 1.1.12.27 Criminal Background Investigation/Fingerprinting Certification
- 1.1.12.28 Buy American Certification (if applicable)
- 1.1.12.29 Roofing Project Certification (if applicable)
- 1.1.12.30 Registered Subcontractors List
- 1.1.12.31 Iran Contracting Act Certification (if applicable)
- 1.1.12.32 Post Bid Interview
- 1.1.12.33 All Plans, Technical Specifications, and Drawings
- 1.1.12.34 Any and all addenda to any of the above documents
- 1.1.12.35 Any and all change orders or written modifications to the above documents if approved in writing by the District

1.1.13 Contract Price: The total monies payable to the Contractor under the terms and conditions of the Contract Documents.

1.1.14 Contract Time: The time period stated in the Agreement for the completion of the Work.

1.1.15 Contractor: The person or persons identified in the Agreement as contracting to perform the Work to be done under this Contract, or the legal representative of such a person or persons.

1.1.16 Daily Job Report(s): Daily Project reports prepared by the Contractor's employee(s) who are present on Site, which shall include the information required herein.

1.1.17 Day(s): Unless otherwise designated, day(s) means calendar day(s).

1.1.18 Department of Industrial Relations (or "DIR"): is responsible, among other things, for labor compliance monitoring and enforcement of California prevailing wage laws and regulations for public works contracts.

1.1.19 Design Professional in General Responsible Charge: See definition of **Architect** above.

1.1.20 Dispute: A separate demand by Contractor for a time extension, or payment of money or damages arising from Work done by or on behalf of the Contractor pursuant to the Contract and payment of which is not otherwise expressly provided for or Contractor is not otherwise entitled to; or an amount of payment disputed by the District.

1.1.21 District: The public agency or the school district for which the Work is performed. The governing board of the District or its designees will act for the District in all matters pertaining to the Contract. The District may, at any time,

1.1.21.1 Direct the Contractor to communicate with or provide notice to the Construction Manager or the Architect on matters for which the Contract Documents indicate the Contractor will communicate with or provide notice to the District; and/or

1.1.21.2 Direct the Construction Manager or the Architect to communicate with or direct the Contractor on matters for which the Contract Documents indicate the District will communicate with or direct the Contractor.

1.1.22 Drawings (or "Plans"): The graphic and pictorial portions of the Contract Documents showing the design, location, scope and dimensions of the work, generally including plans, elevations, sections, details, schedules, sequence of operation, and diagrams.

1.1.23 DSA: Division of the State Architect.

1.1.24 Force Account Directive: A process that may be used when the District and the Contractor cannot agree on a price for a specific portion of work or before the Contractor prepares a price for a specific portion of work and whereby the Contractor performs the work as indicated herein on a time and materials basis.

1.1.25 Job Cost Reports: Any and all reports or records detailing the costs associated with work performed on or related to the Project that Contractor shall maintain for the Project. Specifically, Job Cost Reports shall contain, but are not limited by or to, the following information: a description of the work performed or to be performed on the Project; quantity, if applicable, of work performed (hours, square feet, cubic yards, pounds, etc.) for the Project; Project budget; costs for the Project to date; estimated costs to complete the Project; and expected costs at completion. The Job Cost Reports shall also reflect all Contract cost codes, change orders, elements of non-conforming work, back charges, and additional services.

1.1.26 Labor Commissioner's Office (or "Labor Commissioner", also known as the Division of Labor Standards Enforcement ("DLSE")): Division of the DIR responsible for adjudicating wage claims, investigating discrimination and public works complaints, and enforcing Labor Code statutes and Industrial Welfare Commission orders.

1.1.27 Municipal Separate Storm Sewer System (or "MS4"): A system of conveyances used to collect and/or convey storm water, including, without limitation, catch basins, curbs, gutters, ditches, man-made channels, and storm drains.

1.1.28 Plans: See Drawings.

1.1.29 Premises: The real property owned by the District on which the Site is located.

1.1.30 Product(s): New material, machinery, components, equipment, fixtures and systems forming the Work, including existing materials or components required and approved by the District for reuse.

1.1.31 Product Data: Illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate a material, product, or system for some portion of the Work.

1.1.32 Program Manager: The individual, partnership, corporation, joint venture, or any combination thereof, or its authorized representative, named as such by the District. If no Program Manager is designated for Project that is the subject of this Contract, then all references to Project Manager herein shall be read to refer to District.

1.1.33 Project: The planned undertaking as provided for in the Contract Documents.

1.1.34 Project Inspector (or "Inspector"): The individual(s) retained by the District in accordance with title 24 of the California Code of Regulations to monitor and inspect the Project.

1.1.35 Project Labor Agreement (or "PLA"): a prehire collective bargaining agreement in accordance with Public Contract Code section 2500 et seq. that establishes terms and conditions of employment for a specific construction project or projects and/or is an agreement described in Section 158(f) of Title 29 of the United States Code.

1.1.36 Proposed Change Order (or "PCO"): a written request prepared by the Contractor requesting that the District and the Architect issue a Change Order based upon a proposed change to the Work.

1.1.37 Provide: Shall include "provide complete in place," that is, "furnish and install," and "provide complete and functioning as intended in place" unless specifically stated otherwise.

1.1.38 Qualified SWPPP Practitioners (or "QSP"): certified personnel that attended a State Water Resources Control Board sponsored or approved training class and passed the qualifying exam.

1.1.39 Record Drawings: Reproducible drawings (or Plans) prepared pursuant to the requirements of the Contract Documents that reflect all changes made during the performance of the Work, recording differences between the original design of the Work and the Work as constructed upon completion of the Project. See also **As-Builts**.

1.1.40 Request for Information (or "RFI"): A written request prepared by the Contractor requesting that the Architect provide additional information necessary to clarify or amplify an item in the Contract Documents that the Contractor believes is not clearly shown or called for in the Drawings or Specifications or other portions of the Contract Documents, or to address problems that have arisen under field conditions.

1.1.41 Request for Substitution for Specified Item: A request by Contractor to substitute an equal or superior material, product, thing, or service for a specific material, product, thing, or service that has been designated in the Contract Documents by a specific brand or trade name.

1.1.42 Safety Orders: Written and/or verbal orders for construction issued by the California Division of Occupational Safety and Health ("CalOSHA") or by the United States Occupational Safety and Health Administration ("OSHA").

1.1.43 Safety Plan: Contractor's safety plan specifically adapted for the Project. Contractor's Safety Plan shall comply with all provisions regarding Project safety, including all applicable provisions in these General Conditions.

1.1.44 Samples: Physical examples that illustrate materials, products, equipment, finishes, colors, or workmanship and that, when approved in accordance with the Contract Documents, establish standards by which portions of the Work will be judged.

1.1.45 Shop Drawings: All drawings, prints, diagrams, illustrations, brochures, schedules, and other data that are prepared by the Contractor, a subcontractor, manufacturer, supplier, or distributor, that illustrate how specific portions of the Work shall be fabricated or installed.

1.1.46 Site: The Project site as shown on the Drawings.

1.1.47 Specifications: That portion of the Contract Documents, Division 1 through Division 49, and all technical sections, and addenda to all of these, if any, consisting of written descriptions and requirements of a technical nature of materials, equipment, construction methods and systems, standards, and workmanship.

1.1.48 State: The State of California.

1.1.49 Storm Water Pollution Prevention Plan (or "SWPPP"): A document which identifies sources and activities at a particular facility that may contribute pollutants to storm water and contains specific control measures and time frames to prevent or treat such pollutants.

1.1.50 Subcontractor: A contractor and/or supplier who is under contract with the Contractor or with any other subcontractor, regardless of tier, to perform a portion of the Work of the Project.

1.1.51 Submittal Schedule: The schedule of submittals as provided by Contractor and approved by District.

1.1.52 Surety: The person, firm, or corporation that executes as surety the Contractor's Performance Bond and Payment Bond, and must be a California admitted surety insurer as defined in the Code of Civil Procedure section 995.120.

1.1.53 Work: All labor, materials, equipment, components, appliances, supervision, coordination, and services required by, or reasonably inferred from, the Contract Documents, that are necessary for the construction and completion of the Project.

1.2 Laws Concerning the Contract

Contract is subject to all provisions of the Constitution and laws of California and the United States governing, controlling, or affecting District, or the property, funds, operations, or powers of District,

and such provisions are by this reference made a part hereof. Any provision required by law to be included in this Contract shall be deemed to be inserted.

1.3 No Oral Agreements

No oral agreement or conversation with any officer, agent, or employee of District, either before or after execution of Contract, shall affect or modify any of the terms or obligations contained in any of the documents comprising the Contract.

1.4 No Assignment

Contractor shall not assign this Contract or any part thereof including, without limitation, any services or money to become due hereunder without the prior written consent of the District. Assignment without District's prior written consent shall be null and void. Any assignment of money due or to become due under this Contract shall be subject to a prior lien for services rendered or material supplied for performance of work called for under this Contract in favor of all persons, firms, or corporations rendering services or supplying material to the extent that claims are filed pursuant to the Civil Code, Code of Civil Procedure, Government Code, Labor Code, and/or Public Contract Code, and shall also be subject to deductions for liquidated damages or withholding of payments as determined by District in accordance with this Contract. Contractor shall not assign or transfer in any manner to a Subcontractor or supplier the right to prosecute or maintain an action against the District.

1.5 Notice and Service Thereof

1.5.1 Any notice from one party to the other or otherwise under Contract shall be in writing and shall be dated and signed by the party giving notice or by a duly authorized representative of that party. Any notice shall not be effective for any purpose whatsoever unless served in one of the following manners:

1.5.1.1 If notice is given by personal delivery thereof, it shall be considered delivered on the day of delivery.

1.5.1.2 If notice is given by overnight delivery service, it shall be considered delivered one (1) day after date deposited, as indicated by the delivery service.

1.5.1.3 If notice is given by depositing same in United States mail, enclosed in a sealed envelope, it shall be considered delivered three (3) days after date deposited, as indicated by the postmarked date.

1.5.1.4 If notice is given by registered or certified mail with postage prepaid, return receipt requested, it shall be considered delivered on the day the notice is signed for.

1.5.1.5 Electronic mail may be used for convenience but is not a substitute for the notice and service requirements herein.

1.6 No Waiver

The failure of District in any one or more instances to insist upon strict performance of any of the terms of this Contract or to exercise any option herein conferred shall not be construed as a waiver or relinquishment to any extent of the right to assert or rely upon any such terms or option on any future occasion. No action or failure to act by the District, Architect, or Construction Manager shall constitute a waiver of any right or duty afforded the District under the Contract, nor shall any action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

1.7 Substitutions for Specified Items

Unless the Special Conditions contain different provisions, Contractor shall not substitute different items for any items identified in the Contract Documents without prior written approval of the District.

1.8 Materials and Work

1.8.1 Except as otherwise specifically stated in this Contract, Contractor shall provide and pay for all materials, labor, tools, equipment, transportation, supervision, temporary constructions of every nature, and all other services, management, and facilities of every nature whatsoever necessary to execute and complete this Contract, in a good and workmanlike manner, within the Contract Time.

1.8.2 Unless otherwise specified, all materials shall be new and of the best quality of their respective kinds and grades as noted or specified, workmanship shall be of good quality, and Contractor shall use all diligence to inform itself fully as to the required manufacturer's instructions and to comply therewith.

1.8.3 Materials shall be furnished in ample quantities and at such times as to insure uninterrupted progress of Work and shall be stored properly and protected from the elements, theft, vandalism, or other loss or damage as required.

1.8.4 For all materials and equipment specified or indicated in the Drawings, the Contractor shall provide all labor, materials, equipment, and services necessary for complete assemblies and complete working systems, functioning as intended. Incidental items not indicated on Drawings, nor mentioned in the Specifications, that can legitimately and reasonably be inferred to belong to the Work described, or be necessary in good practice to provide a complete assembly or system, shall be furnished as though itemized here in every detail. In all instances, material and equipment shall be installed in strict accordance with each manufacturer's most recent published recommendations and specifications.

1.8.5 Contractor shall, after award of Contract by District and after relevant submittals have been approved, place orders for materials and/or equipment as specified so that delivery of same may be made without delays to the Work. Contractor shall, upon demand from District, present documentary evidence showing that orders have been placed.

1.8.6 District reserves the right but has no obligation, in response to Contractor's neglect or failure in complying with the above instructions, to place orders for such materials and/or equipment as the District may deem advisable in order that the Work may be completed at the date specified in the Agreement, and all expenses incidental to the procuring of said materials and/or equipment shall be paid for by Contractor or deducted from payment(s) to Contractor.

1.8.7 Contractor warrants good title to all material, supplies, and equipment installed or incorporated in Work and agrees upon completion of all Work to deliver the Site to District, together with all improvements and appurtenances constructed or placed thereon by it, and free from any claims, liens, or charges. Contractor further agrees that neither it nor any person, firm, or corporation furnishing any materials or labor for any work covered by the Contract shall have any right to lien any portion of the Premises or any improvement or appurtenance thereon, except that Contractor may install metering devices or other equipment of utility companies or of political subdivision, title to which is commonly retained by utility company or political subdivision. In the event of installation of any such metering device or equipment, Contractor shall advise District as to owner thereof.

1.8.7.1 If a lien or a claim based on a stop payment notice of any nature should at any time be filed against the Work or any District property, by any entity that has supplied

material or services at the request of the Contractor, Contractor and Contractor's Surety shall promptly, on demand by District and at Contractor's and Surety's own expense, take any and all action necessary to cause any such lien or a claim based on a stop payment notice to be released or discharged immediately therefrom.

1.8.7.2 If the Contractor fails to furnish to the District within ten (10) calendar days after demand by the District, satisfactory evidence that a lien or a claim based on a stop payment notice has been so released, discharged, or secured, the District may discharge such indebtedness and deduct the amount required therefor, together with any and all losses, costs, damages, and attorney's fees and expense incurred or suffered by District from any sum payable to Contractor under the Contract.

1.8.8 Nothing contained in this Article, however, shall defeat or impair the rights of persons furnishing materials or labor under any bond given by Contractor for their protection or any rights under any law permitting such protection or any rights under any law permitting such persons to look to funds due Contractor in hands of District (e.g., stop payment notices), and this provision shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing material for work when no formal contract is entered into for such material.

1.8.9 Title to new materials and/or equipment for the Work of this Contract and attendant liability for its protection and safety shall remain with Contractor until incorporated in the Work of this Contract and accepted by District. No part of any materials and/or equipment shall be removed from its place of storage except for immediate installation in the Work of this Contract. Should the District, in its discretion, allow the Contractor to store materials and/or equipment for the Work off-site, Contractor will store said materials and/or equipment at a bonded warehouse and with appropriate insurance coverage at no cost to District. Contractor shall keep an accurate inventory of all materials and/or equipment in a manner satisfactory to District or its authorized representative and shall, at the District's request, forward it to the District.

2. [RESERVED]

3. ARCHITECT

3.1 The Architect shall represent the District during the Project and will observe the progress and quality of the Work on behalf of the District. Architect shall have the authority to act on behalf of District to the extent expressly provided in the Contract Documents and to the extent determined by District. Architect shall have authority to reject materials, workmanship, and/or the Work whenever rejection may be necessary, in Architect's reasonable opinion, to insure the proper execution of the Contract.

3.2 Architect shall, with the District and on behalf of the District, determine the amount, quality, acceptability, and fitness of all parts of the Work, and interpret the Specifications, Drawings, and shall, with the District, interpret all other Contract Documents.

3.3 Architect shall have all authority and responsibility established by law, including title 24 of the California Code of Regulations.

3.4 Contractor shall provide District and the Construction Manager with a copy of all written communication between Contractor and Architect at the same time as that communication is made to Architect, including, without limitation, all RFIs, correspondence, submittals, claims, and proposed change orders.

4. CONSTRUCTION MANAGER

4.1 If a Construction Manager is used on this Project ("Construction Manager" or "CM"), the Construction Manager will provide administration of the Contract on the District's behalf. After execution of the Contract and Notice to Proceed, all correspondence and/or instructions from Contractor and/or District shall be forwarded through the Construction Manager. The Construction Manager will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences, or procedures or for safety precautions in connection with the Work, which shall all remain the Contractor's responsibility.

4.2 The Construction Manager, however, will have authority to reject materials and/or workmanship not conforming to the Contract Documents, as determined by the District, the Architect, and/or the Project Inspector. The Construction Manager shall also have the authority to require special inspection or testing of any portion of the Work, whether it has been fabricated, installed, or fully completed. Any decision made by the Construction Manager, in good faith, shall not give rise to any duty or responsibility of the Construction Manager to: the Contractor; any Subcontractor; the Contractor or Subcontractor's respective agents, employees; or other persons performing any of the Work. The Construction Manager shall have free access to any or all parts of Work at any time.

4.3 If the District does not use a Construction Manager on this Project, all references to Construction Manager or CM shall be read as District.

5. INSPECTOR, INSPECTIONS, AND TESTS

5.1 Project Inspector

5.1.1 One or more Project Inspector(s), including special Project Inspector(s), as required, will be assigned to the Work by District, in accordance with requirements of title 24, part 1, of the California Code of Regulations, to enforce the building code and monitor compliance with Plans and Specifications for the Project previously approved by the DSA. Duties of Project Inspector(s) are specifically defined in section 4-342 of said part 1 of title 24.

5.1.2 No Work shall be carried on except with the knowledge and under the inspection of the Project Inspector(s). The Project Inspector(s) shall have free access to any or all parts of Work at any time. Contractor shall furnish Project Inspector(s) reasonable opportunities for obtaining such information as may be necessary to keep Project Inspector(s) fully informed respecting progress and manner of work and character of materials, including, but not limited to, submission of form DSA 156 (or the most current version applicable at the time the Work is performed) to the Project Inspector at least 48 hours in advance of the commencement and completion of construction of each and every aspect of the Work. Forms are available on the DSA's website at: <http://www.dgs.ca.gov/dsa/Forms.aspx>. Inspection of Work shall not relieve Contractor from an obligation to fulfill this Contract. Project Inspector(s) and the DSA are authorized to suspend work whenever the Contractor and/or its Subcontractor(s) are not complying with the Contract Documents. Any work stoppage by the Project Inspector(s) and/or DSA shall be without liability to the District. Contractor shall instruct its Subcontractors and employees accordingly.

5.1.3 If Contractor and/or any Subcontractor requests that the Project Inspector(s) perform any inspection off-site, this shall only be done if it is allowable pursuant to applicable regulations and DSA approval, if the Project Inspector(s) agree to do so, and at the expense of the Contractor.

5.2 Tests and Inspections

5.2.1 Tests and Inspections shall comply with title 24, part 1, California Code of Regulations, group 1, article 5, section 4-335, and with the provisions of the Specifications.

5.2.2 The District will select an independent testing laboratory to conduct the tests. Selection of the materials required to be tested shall be by the laboratory or the District's representative and not by the Contractor. The Contractor shall notify the District's representative a sufficient time in advance of its readiness for required observation or inspection.

5.2.3 The Contractor shall notify the District's representative a sufficient time in advance of the manufacture of material to be supplied under the Contract Documents, which must by terms of the Contract Documents be tested, in order that the District may arrange for the testing of same at the source of supply. This notice shall be provided, at a minimum, seventy-two (72) hours prior to the manufacture of the material that needs to be tested.

5.2.4 Any material shipped by the Contractor from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from said representative that such testing and inspection will not be required, shall not be incorporated into and/or onto the Project.

5.2.5 The District will select the testing laboratory and pay for the cost of all tests and inspections. Contractor shall reimburse the District for any and all laboratory costs or other testing costs for any materials found to be not in compliance with the Contract Documents. At the District's discretion, District may elect to deduct laboratory or other testing costs for noncompliant materials from the Contract Price, and such deduction shall not constitute a withholding.

5.3 Costs for After Hours and/or Off Site Inspections

If the Contractor performs Work outside the Inspector's regular working hours or requests the Inspector to perform inspections off Site, costs of any inspections required outside regular working hours or off Site shall be borne by the Contractor and may be invoiced to the Contractor by the District or the District may deduct those expenses from the next Progress Payment.

6. CONTRACTOR

Contractor shall construct and complete, in a good and workmanlike manner, the Work for the Contract Price including any adjustment(s) to the Contract Price pursuant to provisions herein regarding changes to the Contract Price. Except as otherwise noted, Contractor shall provide and pay for all labor, materials, equipment, permits (excluding DSA), fees, licenses, facilities, transportation, taxes, bonds and insurance, and services necessary for the proper execution and completion of the Work, except as indicated herein.

6.1 Status of Contractor

6.1.1 Contractor is and shall at all times be deemed to be an independent contractor and shall be wholly responsible for the manner in which it and its Subcontractors perform the services required of it by the Contract Documents. Nothing herein contained shall be construed as creating the relationship of employer and employee, or principal and agent, between the District, or any of the District's employees or agents, and Contractor or any of Contractor's Subcontractors, agents or employees. Contractor assumes exclusively the responsibility for the acts of its agents, and employees as they relate to the services to be provided during the course and scope of their employment. Contractor, its Subcontractors, agents, and its

employees shall not be entitled to any rights or privileges of District employees. District shall be permitted to monitor the Contractor's activities to determine compliance with the terms of this Contract.

6.1.2 As required by law, Contractor and all Subcontractors shall be properly licensed and regulated by the Contractors State License Board, 9821 Business Park Drive, Sacramento, California 95827, <http://www.cslb.ca.gov>.

6.1.3 As required by law, Contractor and all Subcontractors shall be properly registered as public works contractors by the Department of Industrial Relations at: <https://efiling.dir.ca.gov/PWCR/ActionServlet?action=displayPWCRRegistrationForm> or current URL.

6.1.4 Contractor represents that it has no existing interest and will not acquire any interest, direct or indirect, which could conflict in any manner or degree with the performance of Work required under this Contract and that no person having any such interest shall be employed by Contractor.

6.2 Project Inspection Card(s)

Contractor shall verify that forms DSA 152 (or the current version applicable at the time the Work is performed) are issued for the Project prior to the commencement of construction.

6.3 Contractor's Supervision

6.3.1 During progress of the Work, Contractor shall keep on the Premises, and at all other locations where any Work related to the Contract is being performed, an experienced and competent project manager and construction superintendent who are employees of the Contractor, to whom the District does not object and at least one of whom shall be fluent in English, written and verbal.

6.3.2 The project manager and construction superintendent shall both speak fluently the predominant language of the Contractor's employees.

6.3.3 Before commencing the Work herein, Contractor shall give written notice to District of the name of its project manager and construction superintendent. Neither the Contractor's project manager nor construction superintendent shall be changed except with prior written notice to District. If the Contractor's project manager and/or construction superintendent proves to be unsatisfactory to Contractor, or to District, any of the District's employees, agents, the Construction Manager, or the Architect, Contractor shall notify District in writing before any change occurs, but no less than two (2) business days prior. Any replacement of the project manager and/or construction superintendent shall be made promptly and must be satisfactory to the District. The Contractor's project manager and construction superintendent shall each represent Contractor, and all directions given to Contractor's project manager and/or construction superintendent shall be as binding as if given to Contractor.

6.3.4 Contractor shall give efficient supervision to Work, using its best skill and attention. Contractor shall carefully study and compare all Contract Documents, Drawings, Specifications, and other instructions and shall at once report to District, Construction Manager, and Architect any error, inconsistency, or omission that Contractor or its employees and Subcontractors may discover, in writing, with a copy to District's Project Inspector(s). The Contractor shall have responsibility for discovery of errors, inconsistencies, or omissions.

6.4 Duty to Provide Fit Workers

6.4.1 Contractor and Subcontractor(s) shall at all times enforce strict discipline and good order among their employees and shall not employ or work any unfit person or anyone not skilled in work assigned to that person. It shall be the responsibility of Contractor to ensure compliance with this requirement. District may require Contractor to permanently remove unfit persons from Project Site.

6.4.2 Any person in the employ of Contractor or Subcontractor(s) whom District may deem incompetent or unfit shall be excluded from working on the Project and shall not again be employed on the Project except with the prior written consent of District.

6.4.3 The Contractor shall furnish labor that can work in harmony with all other elements of labor employed or to be employed in the Work.

6.4.4 If Contractor intends to make any change in the name or legal nature of the Contractor's entity, Contractor must first notify the District in writing prior to making any contemplated change. The District shall determine in writing if Contractor's intended change is permissible while performing this Contract.

6.5 Field Office

6.5.1 Contractor shall provide a temporary office on the Work Site for the District's use exclusively, during the term of the Contract.

6.6 Purchase of Materials and Equipment

The Contractor is required to order, obtain, and store materials and equipment sufficiently in advance of its Work at no additional cost or advance payment from District to assure that there will be no delays.

6.7 Documents on Work

6.7.1 Contractor shall at all times keep on the Work Site, or at another location as the District may authorize in writing, one legible copy of all Contract Documents, including Addenda and Change Orders, and Titles 19 and 24 of the California Code of Regulations, the specified edition(s) of the Uniform Building Code, all approved Drawings, Plans, Schedules, and Specifications, and all codes and documents referred to in the Specifications, and made part thereof. These documents shall be kept in good order and available to District, Construction Manager, Architect, Architect's representatives, the Project Inspector(s), and all authorities having jurisdiction. Contractor shall be acquainted with and comply with the provisions of these titles as they relate to this Project. (See particularly the duties of Contractor, Title 24, Part 1, California Code of Regulations, section 4-343.) Contractor shall also be acquainted with and comply with all California Code of Regulations provisions relating to conditions on this Project, particularly Titles 8 and 17. Contractor shall coordinate with Architect and Construction Manager and shall submit its verified report(s) according to the requirements of Title 24.

6.7.2 Daily Job Reports.

6.7.2.1 Contractor shall maintain, at a minimum, at least one (1) set of Daily Job Reports on the Project. These must be prepared by the Contractor's employee(s) who are present on Site, and must include, at a minimum, the following information:

6.7.2.1.1 A brief description of all Work performed on that day.

- 6.7.2.1.2** A summary of all other pertinent events and/or occurrences on that day.
- 6.7.2.1.3** The weather conditions on that day.
- 6.7.2.1.4** A list of all Subcontractor(s) working on that day, including DIR registration numbers.
- 6.7.2.1.5** A list of each Contractor employee working on that day and the total hours worked for each employee.
- 6.7.2.1.6** A complete list of all equipment on Site that day, whether in use or not.
- 6.7.2.1.7** A complete list of all materials, supplies, and equipment delivered on that day.
- 6.7.2.1.8** A complete list of all inspections and tests performed on that day.

6.7.2.2 Each day Contractor shall provide a copy of the previous day's Daily Job Report to the District or the Construction Manager.

6.8 Preservation of Records

Contractor shall maintain, and District shall have the right to inspect, Contractor's financial records for the Project, including, without limitation, Job Cost Reports for the Project in compliance with the criteria set forth herein. The District shall have the right to examine and audit all Daily Job Reports or other Project records of Contractor's project manager(s), project superintendent(s), and/or project foreperson(s), all certified payroll records and/or related documents including, without limitation, Job Cost Reports, payroll, payment, timekeeping and tracking documents; all books, estimates, records, contracts, documents, bid documents, bid cost data, subcontract job cost reports, and other data of the Contractor, any Subcontractor, and/or supplier, including computations and projections related to bidding, negotiating, pricing, or performing the Work or Contract modification, in order to evaluate the accuracy, completeness, and currency of the cost, manpower, coordination, supervision, or pricing data at no additional cost to the District. These documents may be duplicative and/or be in addition to any Bid Documents held in escrow by the District. The Contractor shall make available at its office at all reasonable times the materials described in this paragraph for the examination, audit, or reproduction until three (3) years after final payment under this Contract. Notwithstanding the provisions above, Contractor shall provide any records requested by any governmental agency, if available, after the time set forth above.

6.9 Integration of Work

6.9.1 Contractor shall do all cutting, fitting, patching, and preparation of Work as required to make its several parts come together properly, to fit it to receive or be received by work of other contractors, and to coordinate tolerances to various pieces of work, showing upon, or reasonably implied by, the Drawings and Specifications for the completed structure, and shall conform them as District and/or Architect may direct.

6.9.2 Contractor shall make its own layout of lines and elevations and shall be responsible for the accuracy of both Contractor's and Subcontractors' work resulting therefrom.

6.9.3 Contractor and all Subcontractors shall take all field dimensions required in performance of the Work, and shall verify all dimensions and conditions on the Site. All dimensions affecting proper fabrication and installation of all Work must be verified prior to fabrication by taking field measurements of the true conditions. If there are any discrepancies between dimensions in drawings and existing conditions which will affect the Work, Contractor shall bring such discrepancies to the attention of the District and Architect for adjustment before proceeding with the Work. In doing so, it is recognized that Contractor is not acting in the capacity of a licensed design professional, and that Contractor's examination is made in good faith to facilitate construction and does not create an affirmative responsibility to detect errors, omissions or inconsistencies in the Contract Documents or to ascertain compliance with applicable laws, building codes or regulations. Following receipt of written notice from

Contractor, the District and/or Architect shall inform Contractor what action, if any, Contractor shall take with regard to such discrepancies.

6.9.4 All costs caused by noncompliant, defective, or delayed Work shall be borne by Contractor, inclusive of repair work.

6.9.5 Contractor shall not endanger any work performed by it or anyone else by cutting, excavating, or otherwise altering work and shall not cut or alter work of any other contractor except with consent of District.

6.10 Notifications

6.10.1 Contractor shall notify the Architect and Project Inspector, in writing, of the commencement of construction of each and every aspect of the Work at least 48 hours in advance by submitting form DSA 156 (or the most current version applicable at the time the Work is performed) to the Project Inspector. Forms are available on the DSA's website at: <http://www.dgs.ca.gov/dsa/Forms.aspx>.

6.10.2 Contractor shall notify the Architect and Project Inspector, in writing, of the completion of construction of each and every aspect of the Work at least 48 hours in advance by submitting form DSA 156 (or current version) to the Project Inspector.

6.11 Obtaining of Permits, Licenses and Registrations

Contractor shall secure and pay for all permits (except DSA), licenses, registrations, approvals and certificates necessary for prosecution of Work, including but not limited to those listed in the Special Conditions, if any, before the date of the commencement of the Work or before the permits, licenses, registrations, approvals and certificates are legally required to continue the Work without interruption. The Contractor shall obtain and pay, only when legally required, for all licenses, registrations, approvals, permits, inspections, and inspection certificates required to be obtained from or issued by any authority having jurisdiction over any part of the Work included in the Contract. All final permits, licenses, registrations, approvals and certificates shall be delivered to District before demand is made for final payment.

6.12 Royalties and Patents

6.12.1 Contractor shall obtain and pay, only when legally required, all royalties and license fees necessary for prosecution of Work before the earlier of the date of the commencement of the Work or the date that the license is legally required to continue the Work without interruption. Contractor shall defend suits or claims of infringement of patent, copyright, or other rights and shall hold the District, the Architect, and the Construction Manager harmless and indemnify them from loss on account thereof except when a particular design, process, or make or model of product is required by the Contract Documents. However, if the Contractor has reason to believe that the required design, process, or product is an infringement of a patent or copyright, the Contractor shall indemnify and defend the District, Architect and Construction Manager against any loss or damage unless the Contractor promptly informs the District of its information.

6.12.2 The review by the District or Architect of any method of construction, invention, appliance, process, article, device, or material of any kind shall be only its adequacy for the Work and shall not approve use by the Contractor in violation of any patent or other rights of any person or entity.

6.13 Work to Comply With Applicable Laws and Regulations

6.13.1 Contractor shall give all notices and comply with the following specific laws, ordinances, rules, and regulations and all other applicable laws, ordinances, rules, and regulations bearing on conduct of Work as indicated and specified, including but not limited to the appropriate statutes and administrative code sections. If Contractor observes that Drawings and Specifications are at variance therewith, or should Contractor become aware of the development of conditions not covered by Contract Documents that may result in finished Work being at variance therewith, Contractor shall promptly notify District in writing and any changes deemed necessary by District shall be made as provided in Contract for changes in Work.

6.13.1.1 National Electrical Safety Code, U. S. Department of Commerce

6.13.1.2 National Board of Fire Underwriters' Regulations

6.13.1.3 International Building Code, latest addition, and the California Code of Regulations, title 24, and other amendments

6.13.1.4 Manual of Accident Prevention in Construction, latest edition, published by A.G.C. of America

6.13.1.5 Industrial Accident Commission's Safety Orders, State of California

6.13.1.6 Regulations of the State Fire Marshall (title 19, California Code of Regulations) and Pertinent Local Fire Safety Codes

6.13.1.7 Americans with Disabilities Act

6.13.1.8 Education Code of the State of California

6.13.1.9 Government Code of the State of California

6.13.1.10 Labor Code of the State of California, division 2, part 7, Public Works and Public Agencies

6.13.1.11 Public Contract Code of the State of California

6.13.1.12 California Art Preservation Act

6.13.1.13 U. S. Copyright Act

6.13.1.14 U. S. Visual Artists Rights Act

6.13.2 Contractor shall comply with all applicable mitigation measures, if any, adopted by any public agency with respect to this Project pursuant to the California Environmental Quality Act (Public Resources Code section 21000 et seq.).

6.13.3 If Contractor performs any Work that it knew, or through exercise of reasonable care should have known, to be contrary to any applicable laws, ordinance, rules, or regulations, Contractor shall bear all costs arising therefrom and arising from the correction of said Work.

6.13.4 Where Specifications or Drawings state that materials, processes, or procedures must be approved by the DSA, State Fire Marshall, or other body or agency, Contractor shall

be responsible for satisfying requirements of such bodies or agencies applicable at the time the Work is performed, and as determined by those bodies or agencies.

6.14 Safety/Protection of Persons and Property

6.14.1 The Contractor will be solely and completely responsible for conditions of the Work Site, including safety of all persons and property during performance of the Work. This requirement will apply continuously and not be limited to normal working hours.

6.14.2 The wearing of hard hats will be mandatory at all times for all personnel on Site. Contractor shall supply sufficient hard hats to properly equip all employees and visitors.

6.14.3 Any construction review of the Contractor's performance is not intended to include review of the adequacy of the Contractor's safety measures in, on, or near the Work Site.

6.14.4 Implementation and maintenance of safety programs shall be the sole responsibility of the Contractor.

6.14.5 The Contractor shall furnish to the District a copy of the Contractor's safety plan within the time frame indicated in the Contract Documents and specifically adapted for the Project.

6.14.6 Contractor shall be responsible for all damages to persons or property that occur as a result of its fault or negligence in connection with the prosecution of this Contract and shall take all necessary measures and be responsible for the proper care and completion and final acceptance by District. All Work shall be solely at Contractor's risk with the exception of damage to the Work caused by "acts of God" as defined in Public Contract Code section 7105.

6.14.7 Contractor shall take, and require Subcontractors to take, all necessary precautions for safety of workers on the Project and shall comply with all applicable federal, state, local, and other safety laws, standards, orders, rules, regulations, and building codes to prevent accidents or injury to persons on, about, or adjacent to premises where Work is being performed and to provide a safe and healthful place of employment. Contractor shall furnish, erect, and properly maintain at all times, all necessary safety devices, safeguards, construction canopies, signs, nets, barriers, lights, and watchmen for protection of workers and the public and shall post danger signs warning against hazards created by such features in the course of construction.

6.14.8 Hazards Control – Contractor shall store volatile wastes in covered metal containers and remove them from the Site daily. Contractor shall prevent accumulation of wastes that create hazardous conditions. Contractor shall provide adequate ventilation during use of volatile or noxious substances.

6.14.9 Contractor shall designate a responsible member of its organization on the Project, whose duty shall be to post information regarding protection and obligations of workers and other notices required under occupational safety and health laws, to comply with reporting and other occupational safety requirements, and to protect the life, safety, and health of workers. Name and position of person so designated shall be reported to District by Contractor.

6.14.10 Contractor shall correct any violations of safety laws, rules, orders, standards, or regulations. Upon the issuance of a citation or notice of violation by the Division of Occupational Safety and Health, Contractor shall correct such violation promptly.

6.14.11 Contractor shall comply with any District storm water requirements that are approved by the District and applicable to the Project, at no additional cost to the District.

6.14.12 In an emergency affecting safety of life or of work or of adjoining property, Contractor, without special instruction or authorization, shall act, at its discretion, to prevent such threatened loss or injury. Any compensation claimed by Contractor on account of emergency work shall be determined by agreement.

6.14.13 All salvage materials will become the property of the Contractor and shall be removed from the Site unless otherwise called for in the Contract Documents. However, the District reserves the right to designate certain items of value that shall be turned over to the District unless otherwise directed by District.

6.14.14 All connections to public utilities and/or existing on-site services shall be made and maintained in such a manner as to not interfere with the continuing use of same by the District during the entire progress of the Work.

6.14.15 Contractor shall provide such heat, covering, and enclosures as are necessary to protect all Work, materials, equipment, appliances, and tools against damage by weather conditions, such as extreme heat, cold, rain, snow, dry winds, flooding, or dampness.

6.14.16 The Contractor shall protect and preserve the Work from all damage or accident, providing any temporary roofs, window and door coverings, boxings, or other construction as required by the Architect. The Contractor shall be responsible for existing structures, walks, roads, trees, landscaping, and/or improvements in working areas; and shall provide adequate protection therefore. If temporary removal is necessary of any of the above items, or damage occurs due to the Work, the Contractor shall replace same at his expense with same kind, quality, and size of Work or item damaged. This shall include any adjoining property of the District and others.

6.14.17 Contractor shall take adequate precautions to protect existing roads, sidewalks, curbs, pavements, utilities, adjoining property, and structures (including, without limitation, protection from settlement or loss of lateral support), and to avoid damage thereto, and repair any damage thereto caused by construction operations.

6.14.18 Contractor shall confine apparatus, the storage of materials, and the operations of workers to limits indicated by law, ordinances, permits, or directions of Architect, and shall not interfere with the Work or unreasonably encumber Premises or overload any structure with materials. Contractor shall enforce all instructions of District and Architect regarding signs, advertising, fires, and smoking, and require that all workers comply with all regulations while on Project Site.

6.14.19 Contractor, Contractor's employees, Subcontractors, Subcontractors' employees, or any person associated with the Work shall conduct themselves in a manner appropriate for a school site. No verbal or physical contact with neighbors, students, and faculty, profanity, or inappropriate attire or behavior will be permitted. District may require Contractor to permanently remove non-complying persons from Project Site.

6.14.20 Contractor shall take care to prevent disturbing or covering any survey markers, monuments, or other devices marking property boundaries or corners. If such markers are disturbed, Contractor shall have a civil engineer, registered as a professional engineer in California, replace them at no cost to District.

6.14.21 In the event that the Contractor enters into any agreement with owners of any adjacent property to enter upon the adjacent property for the purpose of performing the Work, Contractor shall fully indemnify, defend, and hold harmless each person, entity, firm, or agency that owns or has any interest in adjacent property. The form and content of the agreement of indemnification shall be approved by the District prior to the commencement of any Work on or

about the adjacent property. The Contractor shall also indemnify the District as provided in the indemnification provision herein. These provisions shall be in addition to any other requirements of the owners of the adjacent property.

6.15 Working Evenings and Weekends

Contractor may be required to work increased hours, evenings, and/or weekends at no additional cost to the District. Contractor shall give the District seventy-two (72) hours' notice prior to performing any evening and/or weekend work. Contractor shall perform all evening and/or weekend work only upon District's approval and in compliance with all applicable rules, regulations, laws, and local ordinances including, without limitation, all noise and light limitations. Contractor shall reimburse the District for any increased or additional Inspector charges as a result of Contractor's increased hours, or evening and/or weekend work.

6.16 Cleaning Up

6.16.1 The Contractor shall provide all services, labor, materials, and equipment necessary for protecting and securing the Work, all school occupants, furnishings, equipment, and building structure from damage until its completion and final acceptance by District. Dust barriers shall be provided to isolate dust and dirt from construction operations. At completion of the Work and portions thereof, Contractor shall clean to the original state any areas beyond the Work area that become dust laden as a result of the Work. The Contractor must erect the necessary warning signs and barricades to ensure the safety of all school occupants. The Contractor at all times must maintain good housekeeping practices to reduce the risk of fire damage and must make a fire extinguisher, fire blanket, and/or fire watch, as applicable, available at each location where cutting, braising, soldering, and/or welding is being performed or where there is an increased risk of fire.

6.16.2 Contractor at all times shall keep Premises, including property immediately adjacent thereto, free from debris such as waste, rubbish (including personal rubbish of workers, e.g., food wrappers, etc.), and excess materials and equipment caused by the Work. Contractor shall not leave debris under, in, or about the Premises (or surrounding property or neighborhood), but shall promptly remove same from the Premises on a daily basis. If Contractor fails to clean up, District may do so and the cost thereof shall be charged to Contractor. If Contract is for work on an existing facility, Contractor shall also perform specific clean-up on or about the Premises upon request by the District as it deems necessary for the continuing education process. Contractor shall comply with all related provisions of the Specifications.

6.16.3 If the Construction Manager, Architect, or District observes the accumulation of trash and debris, the District will give the Contractor a 24-hour written notice to mitigate the condition.

6.16.4 Should the Contractor fail to perform the required clean-up, or should the clean-up be deemed unsatisfactory by the District, the District will then perform the clean-up. All cost associated with the clean-up work (including all travel, payroll burden, and costs for supervision) will be deducted from the Contract Price, or District may withhold those amounts from payment(s) to Contractor.

7. SUBCONTRACTORS

7.1 Contractor shall provide the District with information for all Subcontracts as indicated in the Contractor's Submittals and Schedules Section herein.

7.2 No contractual relationship exists between the District and any Subcontractor, supplier, or sub-subcontractor by reason of this Contract.

7.3 Contractor agrees to bind every Subcontractor by terms of this Contract as far as those terms that are applicable to Subcontractor's work including, without limitation, all labor, wage & hour, apprentice and related provisions and requirements. If Contractor shall subcontract any part of this Contract, Contractor shall be as fully responsible to District for acts and omissions of any Subcontractor and of persons either directly or indirectly employed by any Subcontractor, including Subcontractor caused Project delays, as it is for acts and omissions of persons directly employed by Contractor. The divisions or sections of the Specifications and/or the arrangement of the drawings are not intended to control the Contractor in dividing the Work among Subcontractors or limit the work performed by any trade.

7.4 District's consent to, or approval of, or failure to object to, any Subcontractor under this Contract shall not in any way relieve Contractor of any obligations under this Contract and no such consent shall be deemed to waive any provisions of this Contract.

7.5 Contractor is directed to familiarize itself with sections 4100 through 4114 of the Public Contract Code of the State of California, as regards subletting and subcontracting, and to comply with all applicable requirements therein. In addition, Contractor is directed to familiarize itself with sections 1720 through 1861 of the Labor Code of the State of California, as regards the payment of prevailing wages and related issues, and to comply with all applicable requirements therein including, without limitation, section 1775 and the Contractor's and Subcontractors' obligations and liability for violations of prevailing wage law and other applicable laws.

7.6 No Contractor whose Bid is accepted shall, without consent of the awarding authority and in full compliance with section 4100 et seq. of the Public Contract Code, including, without limitation, sections 4107, 4107.5, and 4109 of the Public Contract Code, and section 1771.1 of the Labor Code, either:

7.6.1 Substitute any person as a Subcontractor in place of the Subcontractor designated in the original Bid; or

7.6.2 Permit any Subcontract to be assigned or transferred, or allow any portion of the Work to be performed by anyone other than the original Subcontractor listed in the Bid; or

7.6.3 Sublet or subcontract any portion of the Work in excess of one-half of one percent (0.5%) of the Contractor's total bid as to which his original bid did not designate a Subcontractor.

7.7 The Contractor shall be responsible for the coordination of the trades, Subcontractors, sub-subcontractors, and material or equipment suppliers working on the Project.

7.7.1 If the Contract is valued at \$1 million or more and uses, or plans to use, state bond funds, then Contractor is responsible for ensuring that first tier Subcontractors holding C-4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43, and/or C-46 licenses are prequalified by the District to work on the Project pursuant to Public Contract Code section 20111.6.

7.7.2 Contractor is responsible for ensuring that all Subcontractors are properly registered as public works contractors by the Department of Industrial Relations.

7.8 Contractor is solely responsible for settling any differences between the Contractor and its Subcontractor(s) or between Subcontractors.

7.9 Contractor must include in all of its subcontracts the assignment provisions as indicated in the Termination section of these General Conditions.

8. OTHER CONTRACTS/CONTRACTORS

8.1 District reserves the right to let other contracts, and/or to perform work with its own forces, in connection with the Project. Contractor shall afford other contractors reasonable opportunity for introduction and storage of their materials and execution of their work and shall properly coordinate and connect Contractor's Work with the work of other contractors.

8.2 In addition to Contractor's obligation to protect its own Work, Contractor shall protect the work of any other contractor that Contractor encounters while working on the Project.

8.3 If any part of Contractor's Work depends for proper execution or results upon work of District or any other contractor, the Contractor shall inspect and, before proceeding with its Work, promptly report to the District in writing any defects in District's or any other contractor's work that render Contractor's Work unsuitable for proper execution and results. Contractor shall be held accountable for damages to District for District's or any other contractor's work that Contractor failed to inspect or should have inspected. Contractor's failure to inspect and report shall constitute Contractor's acceptance of all District's or any other contractor's work as fit and proper for reception of Contractor's Work, except as to defects that may develop in District's or any other contractor's work after execution of Contractor's Work and not caused by execution of Contractor's Work.

8.4 To ensure proper execution of its subsequent work, Contractor shall measure and inspect work already in place and shall at once report to the District in writing any discrepancy between that executed work and the Contract Documents.

8.5 Contractor shall ascertain to its own satisfaction the scope of the Project and nature of District's or any other contracts that have been or may be awarded by District in prosecution of the Project to the end that Contractor may perform this Contract in light of the other contracts, if any.

8.6 Nothing herein contained shall be interpreted as granting to Contractor exclusive occupancy of the Site, the Premises, or of the Project. Contractor shall not cause any unnecessary hindrance or delay to the use and/or school operation(s) of the Premises and/or to District or any other contractor working on the Project. If simultaneous execution of any contract or school operation is likely to cause interference with performance of Contractor's Contract, Contractor shall coordinate with those contractor(s), person(s), and/or entity(s) and shall notify the District of the resolution.

9. DRAWINGS AND SPECIFICATIONS

9.1 A complete list of all Drawings that form a part of the Contract is to be found as an index on the Drawings themselves, and/or may be provided to the Contractor and/or in the Table of Contents.

9.2 Materials or Work described in words that so applied have a well-known technical or trade meaning shall be deemed to refer to recognized standards, unless noted otherwise.

9.3 Trade Name or Trade Term. It is not the intention of this Contract to go into detailed descriptions of any materials and/or methods commonly known to the trade under "trade name" or "trade term." The mere mention or notation of "trade name" or "trade term" shall be considered a

sufficient notice to Contractor that it will be required to complete the work so named, complete, finished, and operable, with all its appurtenances, according to the best practices of the trade.

9.4 The naming of any material and/or equipment shall mean furnishing and installing of same, including all incidental and accessory items thereto and/or labor therefor, as per best practices of the trade(s) involved, unless specifically noted otherwise.

9.5 Contract Documents are complementary, and what is called for by one shall be binding as if called for by all. As such, Drawings and Specifications are intended to be fully cooperative and to agree. However, if Contractor observes that Drawings and Specifications are in conflict with the Contract Documents, Contractor shall promptly notify District and Architect in writing, and any necessary changes shall be made as provided in the Contract Documents.

9.6 In the case of discrepancy or ambiguity in the Contract Documents, the order of precedence in the Agreement shall prevail. However, in the case of discrepancy or ambiguity solely between and among the Drawings and Specifications, the discrepancy or ambiguity shall be resolved in favor of the interpretation that will provide District with the functionally complete and operable Project described in the Drawings and Specifications. In case of ambiguity, conflict, or lack of information, District will furnish clarifications with reasonable promptness.

9.7 Drawings and Specifications are intended to comply with all laws, ordinances, rules, and regulations of constituted authorities having jurisdiction, and where referred to in the Contract Documents, the laws, ordinances, rules, and regulations shall be considered as a part of the Contract within the limits specified. Contractor shall bear all expense of correcting work done contrary to said laws, ordinances, rules, and regulations.

9.8 As required by Section 4-317(c), Part 1, Title 24, CCR: "Should any existing conditions such as deterioration or non-complying construction be discovered which is not covered by the DSA-approved documents wherein the finished work will not comply with Title 24, California Code of Regulations, a construction change document, or a separate set of plans and specifications, detailing and specifying the required repair work shall be submitted to and approved by DSA before proceeding with the repair work."

9.9 Ownership of Drawings

All copies of Plans, Drawings, Designs, Specifications, and copies of other incidental architectural and engineering work, or copies of other Contract Documents furnished by District, are the property of District. They are not to be used by Contractor in other work and, with the exception of signed sets of Contract Documents, are to be returned to District on request at completion of Work, or may be used by District as it may require without any additional costs to District. Neither the Contractor nor any Subcontractor, or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications, and other documents prepared by the Architect. District hereby grants the Contractor, Subcontractors, sub-subcontractors, and material or equipment suppliers a limited license to use applicable portions of the Drawings prepared for the Project in the execution of their Work under the Contract Documents.

10. CONTRACTOR'S SUBMITTALS AND SCHEDULES

Contractor's submittals shall comply with the provisions and requirements of the Specifications including, without limitation Submittals.

10.1 Schedule of Work, Schedule of Submittals, and Schedule of Values

10.1.1 Within **TEN (10)** calendar days after the date of the Notice to Proceed (unless otherwise specified in the Specifications), the Contractor shall prepare and submit to the District

for review, in a form supported by sufficient data to substantiate its accuracy as the District may require:

10.1.1.1 Preliminary Schedule. A preliminary schedule of construction indicating the starting and completion dates of the various stages of the Work, including any information and following any form as may be specified in the Specifications. Once approved by District, this shall become the Construction Schedule. This schedule shall include and identify all tasks that are on the Project's critical path with a specific determination of the start and completion of each critical path task as well as all Contract milestones and each milestone's completion date(s) as may be required by the District.

10.1.1.2 Preliminary Schedule of Values. A preliminary schedule of values for all of the Work, which must include quantities and prices of items aggregating the Contract Price and must subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Unless the Special Conditions contain different limits, this preliminary schedule of values shall include, at a minimum, the following information and the following structure:

10.1.1.2.1 Divided into at least the following categories:

- 10.1.1.2.1.1** Overhead and profit;
- 10.1.1.2.1.2** Supervision;
- 10.1.1.2.1.3** General conditions;
- 10.1.1.2.1.4** Layout;
- 10.1.1.2.1.5** Mobilization;
- 10.1.1.2.1.6** Submittals;
- 10.1.1.2.1.7** Bonds and insurance;
- 10.1.1.2.1.8** Close-out/Certification documentation;
- 10.1.1.2.1.9** Demolition;
- 10.1.1.2.1.10** Installation;
- 10.1.1.2.1.11** Rough-in;
- 10.1.1.2.1.12** Finishes;
- 10.1.1.2.1.13** Testing;
- 10.1.1.2.1.14** Punchlist and acceptance.

10.1.1.2.2 And also divided by each of the following areas:

- 10.1.1.2.2.1** Site work;
- 10.1.1.2.2.2** By each building;
- 10.1.1.2.2.3** By each floor.

10.1.1.2.3 The preliminary schedule of values shall not provide for values any greater than the following percentages of the Contract value:

- 10.1.1.2.3.1** Mobilization and layout combined to equal not more than 1%;
- 10.1.1.2.3.2** Submittals, samples and shop drawings combined to equal not more than 3%;
- 10.1.1.2.3.3** Bonds and insurance combined to equal not more than 2%.

10.1.1.2.4 Closeout documentation shall have a value in the preliminary schedule of not less than 5%.

10.1.1.2.5 Notwithstanding any provision of the Contract Documents to the contrary, payment of the Contractor's overhead, supervision, general conditions costs,

and profit, as reflected in the Cost Breakdown, shall be paid based on percentage complete, with the disbursement of Progress Payments and the Final Payment.

10.1.1.2.6 Contractor shall certify that the preliminary schedule of values as submitted to the District is accurate and reflects the costs as developed in preparing Contractor's bid. The preliminary schedule of values shall be subject to the District's review and approval of the form and content thereof. In the event that the District objects to any portion of the preliminary schedule of values, the District shall notify the Contractor, in writing, of the District's objection(s) to the preliminary schedule of values. Within five (5) calendar days of the date of the District's written objection(s), Contractor shall submit a revised preliminary schedule of values to the District for review and approval. The foregoing procedure for the preparation, review and approval of the preliminary schedule of values shall continue until the District has approved the entirety of the preliminary schedule of values.

10.1.1.2.7 Once the preliminary schedule of values is approved by the District, this shall become the Schedule of Values. The Schedule of Values shall not be thereafter modified or amended by the Contractor without the prior consent and approval of the District, which may be granted or withheld in the sole discretion of the District.

10.1.1.3 Preliminary Schedule of Submittals. A preliminary schedule of submittals, including Shop Drawings, Product Data, and Samples submittals. Once approved by District, this shall become the Submittal Schedule. All submittals shall be forwarded to the District by the date indicated on the approved Submittal Schedule, unless an earlier date is necessary to maintain the Construction Schedule, in which case those submittals shall be forwarded to the District so as not to delay the Construction Schedule. Upon request by the District, Contractor shall provide an electronic copy of all submittals to the District. All submittals shall be submitted no later than 90 days after the Notice to Proceed.

10.1.1.4 Safety Plan. Contractor's Safety Plan specifically adapted for the Project. Contractor's Safety Plan shall comply with the following requirements:

10.1.1.4.1 All applicable requirements of California Division of Occupational Safety and Health ("CalOSHA") and/or of the United States Occupational Safety and Health Administration ("OSHA").

10.1.1.4.2 All provisions regarding Project safety, including all applicable provisions in these General Conditions.

10.1.1.4.3 Contractor's Safety Plan shall be in English and in the language(s) of the Contractor's and its Subcontractors' employees.

10.1.1.5 Complete Registered Subcontractors List. The name, address, telephone number, facsimile number, California State Contractors License number, classification, DIR registration number and monetary value of all Subcontracts of any tier for parties furnishing labor, material, or equipment for completion of the Project.

10.1.2 Contractor must provide all schedules both in hard copy and electronically, in a format (e.g., Microsoft Project or Primavera) approved in advance by the District.

10.1.3 The District will review the schedules submitted and the Contractor shall make changes and corrections in the schedules as requested by the District and resubmit the schedules until approved by the District.

10.1.4 The District shall have the right at any time to revise the schedule of values if, in the District's sole opinion, the schedule of values does not accurately reflect the value of the Work performed.

10.1.5 All submittals and schedules must be approved by the District before Contractor can rely on them as a basis for payment.

10.2 Monthly Progress Schedule(s)

10.2.1 Contractor shall provide Monthly Progress Schedule(s) to the District. A Monthly Progress Schedule shall update the approved Construction Schedule or the last Monthly Progress Schedule, showing all work completed and to be completed as well as updating the Registered Subcontractors List. The monthly Progress Schedule shall be sent within the timeframe requested by the District and shall be in a format acceptable to the District and contain a written narrative of the progress of work that month and any changes, delays, or events that may affect the work. The process for District approval of the Monthly Progress Schedule shall be the same as the process for approval of the Construction Schedule.

10.2.2 Contractor shall submit Monthly Progress Schedule(s) with all payment applications.

10.2.3 Contractor must provide all schedules both in hard copy and electronically, in a format (e.g., Microsoft Project or Primavera) approved in advance by the District.

10.2.4 The District will review the schedules submitted and the Contractor shall make changes and corrections in the schedules as requested by the District and resubmit the schedules until approved by the District.

10.2.5 The District shall have the right at any time to revise the schedule of values if, in the District's sole opinion, the schedule of values does not accurately reflect the value of the Work performed.

10.2.6 All submittals and schedules must be approved by the District before Contractor can rely on them as a basis for payment.

10.3 Material Safety Data Sheets (MSDS)

Contractor is required to ensure Material Safety Data Sheets are available in a readily accessible place at the Work Site for any material requiring a Material Safety Data Sheet per the federal "Hazard Communication" standard, or employees' "right to know" law. The Contractor is also required to ensure proper labeling on substances brought onto the job site and that any person working with the material or within the general area of the material is informed of the hazards of the substance and follows proper handling and protection procedures. Two additional copies of the Material Safety Data Sheets shall also be submitted directly to the District.

11. SITE ACCESS, CONDITIONS, AND REQUIREMENTS

11.1 Site Investigation

Before bidding on this Work, Contractor shall make a careful investigation of the Site and thoroughly familiarize itself with the requirements of the Contract. By the act of submitting a bid for the Work included in this Contract, Contractor shall be deemed to have made a complete study and investigation, and to be familiar with and accepted the existing conditions of the Site.

Prior to commencing the Work, Contractor and the District's representative shall survey the Site to document the condition of the Site. Contractor will record the survey in digital videotape format and provide an electronic copy to the District within fourteen (14) days of the survey. This electronic record shall serve as a basis for determining any damages caused by the Contractor during the Project. The Contractor may also document any pre-existing conditions in writing, provided that both the Contractor and the District's representative agree on said conditions and sign a memorandum documenting the same.

11.2 Soils Investigation Report

11.2.1 When a soils investigation report obtained from test holes at Site or for the Project is available, that report may be available to the Contractor but shall not be a part of this Contract and shall not alleviate or excuse the Contractor's obligation to perform its own investigation. Any information obtained from that report or any information given on Drawings as to subsurface soil condition or to elevations of existing grades or elevations of underlying rock is approximate only, is not guaranteed, does not form a part of this Contract, and Contractor may not rely thereon. By submitting its bid, Contractor acknowledges that it has made visual examination of Site and has made whatever tests Contractor deems appropriate to determine underground condition of soil.

11.2.2 Contractor agrees that no claim against District will be made by Contractor for damages and hereby waives any rights to damages if, during progress of Work, Contractor encounters subsurface or latent conditions at Site materially differing from those shown on Drawings or indicated in Specifications, or for unknown conditions of an unusual nature that differ materially from those ordinarily encountered in the work of the character provided for in Plans and Specifications, except as indicated in the provisions of these General Conditions regarding trenches, trenching, and/or existing utility lines.

11.3 Access to Work

District and its representatives shall at all times have access to Work wherever it is in preparation or progress, including storage and fabrication. Contractor shall provide safe and proper facilities for such access so that District's representatives may perform their functions.

11.4 Layout and Field Engineering

11.4.1 All field engineering required for layout of this Work and establishing grades for earthwork operations shall be furnished by Contractor at its expense. This Work shall be done by a qualified, California-registered civil engineer approved in writing by District and Architect. Any required Record and/or As-Built Drawings of Site development shall be prepared by the approved civil engineer.

11.4.2 The Contractor shall be responsible for having ascertained pertinent local conditions such as location, accessibility, and general character of the Site and for having satisfied itself as to the conditions under which the Work is to be performed. Contractor shall follow best practices, including but not limited to potholing to avoid utilities. District shall not be liable for any claim for allowances because of Contractor's error, failure to follow best practices, or negligence in acquainting itself with the conditions at the Site.

11.4.3 Contractor shall protect and preserve established benchmarks and monuments and shall make no changes in locations without the prior written approval of District. Contractor shall replace any benchmarks or monuments that are lost or destroyed subsequent to proper notification of District and with District's approval.

11.5 Utilities

Utilities shall be provided as indicated in the Specifications.

11.6 Sanitary Facilities

Sanitary facilities shall be provided as indicated in the Specifications.

11.7 Surveys

Contractor shall provide surveys done by a California-licensed civil engineer surveyor to determine locations of construction, grading, and site work as required to perform the Work.

11.8 Regional Notification Center

The Contractor, except in an emergency, shall contact the appropriate regional notification center at least two (2) days prior to commencing any excavation if the excavation will be conducted in an area or in a private easement that is known, or reasonably should be known, to contain subsurface installations other than the underground facilities owned or operated by the District, and obtain an inquiry identification number from that notification center. No excavation shall be commenced and/or carried out by the Contractor unless an inquiry identification number has been assigned to the Contractor or any Subcontractor and the Contractor has given the District the identification number. Any damages arising from Contractor's failure to make appropriate notification shall be at the sole risk and expense of the Contractor. Any delays caused by failure to make appropriate notification shall be at the sole risk of the Contractor and shall not be considered for an extension of the Contract Time.

11.9 Existing Utility Lines

11.9.1 Pursuant to Government Code section 4215, District assumes the responsibility for removal, relocation, and protection of main or trunk utility lines and facilities located on the construction Site at the time of commencement of construction under this Contract with respect to any such utility facilities that are not identified in the Plans and Specifications. Contractor shall not be assessed for liquidated damages for delay in completion of the Project caused by failure of District or the owner of a utility to provide for removal or relocation of such utility facilities.

11.9.2 Locations of existing utilities provided by District shall not be considered exact, but approximate within a reasonable margin and shall not relieve Contractor of responsibilities to exercise reasonable care or costs of repair due to Contractor's failure to do so. District shall compensate Contractor for the costs of locating, repairing damage not due to the failure of Contractor to exercise reasonable care, and removing or relocating such utility facilities not indicated in the Plans and Specifications with reasonable accuracy, and for equipment necessarily idle during such work.

11.9.3 No provision herein shall be construed to preclude assessment against Contractor for any other delays in completion of the Work. Nothing in this Article shall be deemed to require District to indicate the presence of existing service laterals, appurtenances, or other utility lines, within the exception of main or trunk utility lines or whenever the presence of these utilities on the Site of the construction Project can be inferred from the presence of other visible facilities, such as buildings, meter junction boxes, on or adjacent to the Site of the construction.

11.9.4 If Contractor, while performing Work under this Contract, discovers utility facilities not identified by District in Contract Plans and Specifications, Contractor shall immediately

notify the District and the utility in writing. The cost of repair for damage to above-mentioned visible facilities without prior written notification to the District shall be borne by the Contractor.

11.10 Notification

Contractor understands, acknowledges and agrees that the purpose for prompt notification to the District pursuant to these provisions is to allow the District to investigate the condition(s) so that the District shall have the opportunity to decide how the District desires to proceed as a result of the condition(s). Accordingly, failure of Contractor to promptly notify the District in writing, pursuant to these provisions, shall constitute Contractor's waiver of any claim for damages or delay incurred as a result of the condition(s).

11.11 Hazardous Materials

Contractor shall comply with all provisions and requirements of the Contract Documents related to hazardous materials including, without limitation, Hazardous Materials Procedures and Requirements.

11.12 No Signs

Neither the Contractor nor any other person or entity shall display any signs not required by law or the Contract Documents at the Site, fences trailers, offices, or elsewhere on the Site without specific prior written approval of the District.

12. TRENCHES

12.1 Trenches Greater Than Five Feet

Pursuant to Labor Code section 6705, if the Contract Price exceeds \$25,000 and involves the excavation of any trench or trenches five (5) feet or more in depth, the Contractor shall, in advance of excavation, promptly submit to the District and/or a registered civil or structural engineer employed by the District or Architect, a detailed plan, stamped by a licensed engineer retained by the Contractor, showing the design of shoring for protection from the hazard of caving ground during the excavation of such trench or trenches.

12.2 Excavation Safety

If such plan varies from the Shoring System Standards established by the Construction Safety Orders, the plan shall be prepared by a registered civil or structural engineer, but in no case shall such plan be less effective than that required by the Construction Safety Orders. No excavation of such trench or trenches shall be commenced until said plan has been accepted by the District or by the person to whom authority to accept has been delegated by the District.

12.3 No Tort Liability of District

Pursuant to Labor Code section 6705, nothing in this Article shall impose tort liability upon the District or any of its employees.

12.4 No Excavation without Permits

The Contractor shall not commence any excavation Work until it has secured all necessary permits including the required CalOSHA excavation/shoring permit. Any permits shall be prominently displayed on the Site prior to the commencement of any excavation.

12.5 Discovery of Hazardous Waste and/or Unusual Conditions

12.5.1 Pursuant to Public Contract Code section 7104, if the Work involves digging trenches or other excavations that extend deeper than four feet below the Surface, the Contractor shall promptly, and before the following conditions are disturbed, notify the District, in writing, of any:

12.5.1.1 Material that the Contractor believes may be material that is hazardous waste, as defined in section 25117 of the Health and Safety Code, is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.

12.5.1.2 Subsurface or latent physical conditions at the Site differing from those indicated.

12.5.1.3 Unknown physical conditions at the Site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract.

12.5.2 The District shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the Contractor's cost of, or the time required for, performance of any part of the Work, shall issue a Change Order under the procedures described herein.

12.5.3 In the event that a dispute arises between District and the Contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the Work, the Contractor shall not be excused from any scheduled completion date provided for by the Contract, but shall proceed with all work to be performed under the Contract. The Contractor shall retain any and all rights provided either by Contract or by law that pertain to the resolution of disputes and protests.

13. INSURANCE AND BONDS

13.1 Insurance

Unless different provisions and/or limits are indicated in the Special Conditions, all insurance required of Contractor and/or its Subcontractor(s) shall be in the amounts and include the provisions set forth herein.

13.1.1 Commercial General Liability and Automobile Liability Insurance

13.1.1.1 Contractor shall procure and maintain, during the life of this Contract, Commercial General Liability Insurance and Automobile Liability Insurance that shall protect Contractor, District, State, Construction Manager(s), Project Inspector(s), and Architect(s) from all claims for bodily injury, property damage, personal injury, death, advertising injury, and medical payments arising from operations under this Contract. This coverage shall be provided in a form at least as broad as Insurance Services (ISO) Form CG 0001 11188. Contractor shall ensure that Products Liability and Completed Operations coverage, Fire Damage Liability, and Any Auto including owned, non-owned, and hired, are included within the above policies and at the required limits, or Contractor shall procure and maintain these coverages separately.

13.1.1.2 Contractor's deductible or self-insured retention for its Commercial General Liability Insurance policy shall not exceed \$25,000 unless approved in writing by District.

13.1.1.3 All such policies shall be written on an occurrence form.

13.1.2 Excess Liability Insurance

13.1.2.1 Contractor may procure and maintain, during the life of this Contract, an Excess Liability Insurance Policy to meet the policy limit requirements of the required policies if Contractor's underlying policy limits are less than required.

13.1.2.2 There shall be no gap between the per occurrence amount of any underlying policy and the start of the coverage under the Excess Liability Insurance Policy. Any Excess Liability Insurance Policy shall be written on a following form and shall protect Contractor, District, State, Construction Manager(s), Project Manager(s), and Architect(s) in amounts and including the provisions as set forth in the Supplementary Conditions (if any) and/or Special Conditions, and that complies with all requirements for Commercial General Liability and Automobile Liability and Employers' Liability Insurance.

13.1.2.3 The District, in its sole discretion, may accept the Excess Liability Insurance Policy that bring Contractor's primary limits to the minimum requirements herein.

13.1.3 Subcontractor(s): Contractor shall require its Subcontractor(s), if any, to procure and maintain Commercial General Liability Insurance, Automobile Liability Insurance, and Excess Liability Insurance (if Subcontractor elects to satisfy, in part the insurance required herein by procuring and maintaining an Excess Liability Insurance Policy) with forms of coverage and limits equal to the amounts required of the Contractor.

13.1.4 Workers' Compensation and Employers' Liability Insurance

13.1.4.1 In accordance with provisions of section 3700 of the California Labor Code, the Contractor and every Subcontractor shall be required to secure the payment of compensation to its employees.

13.1.4.2 Contractor shall procure and maintain, during the life of this Contract, Workers' Compensation Insurance and Employers' Liability Insurance for all of its employees engaged in work under this Contract, on/or at the Site of the Project. This coverage shall cover, at a minimum, medical and surgical treatment, disability benefits, rehabilitation therapy, and survivors' death benefits. Contractor shall require its Subcontractor(s), if any, to procure and maintain Workers' Compensation Insurance and Employers' Liability Insurance for all employees of Subcontractor(s). Any class of employee or employees not covered by a Subcontractor's insurance shall be covered by Contractor's insurance. If any class of employee or employee engaged in Work under this Contract, on or at the Site of the Project, is not protected under the Workers' Compensation Insurance, Contractor shall provide, or shall cause a Subcontractor to provide, adequate insurance coverage for the protection of any employee(s) not otherwise protected before any of those employee(s) commence work.

13.1.5 Builder's Risk Insurance: Builder's Risk "All Risk" Insurance

Contractor shall procure and maintain, during the life of this Contract, Builder's Risk (Course of Construction), or similar first party property coverage acceptable to the District, issued on a replacement cost value basis. The cost shall be consistent with the total replacement cost of all insurable Work of the Project included within the Contract Documents. Coverage is to insure against all risks of accidental physical loss and shall include without limitation the perils of vandalism and/or malicious mischief (both without any limitation regarding vacancy or occupancy), sprinkler leakage, civil authority, theft, sonic disturbance, earthquake, flood, collapse, wind, rain, dust, fire, war, terrorism, lightning, smoke, and rioting. Coverage shall

include debris removal, demolition, increased costs due to enforcement of all applicable ordinances and/or laws in the repair and replacement of damaged and undamaged portions of the property, and reasonable costs for the Architect's and engineering services and expenses required as a result of any insured loss upon the Work and Project, including completed Work and Work in progress, to the full insurable value thereof.

13.1.6 Pollution Liability Insurance

13.1.6.1 Contractor shall procure and maintain Pollution Liability Insurance that shall protect Contractor, District, State, Construction Manager(s), Project Inspector(s), and Architect(s) from all claims for bodily injury, property damage, including natural resource damage, cleanup costs, removal, storage, disposal, and/or use of the pollutant arising from operations under this Contract, and defense, including costs and expenses incurred in the investigation, defense, or settlement of claims. Coverage shall apply to sudden and/or gradual pollution conditions resulting from the escape or release of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids, or gases, natural gas, waste materials, or other irritants, contaminants, or pollutants, including asbestos. This coverage shall be provided in a form at least as broad as Insurance Services Offices, Inc. (ISO) Form CG 2415, or Contractor shall procure and maintain these coverages separately.

13.1.6.2 Contractor shall warrant that any retroactive date applicable to coverage under the policy predates the effective date of the Contract and that continuous coverage will be maintained or an extended reporting or discovery period will be exercised for a period of three (3) years, beginning from the time that the Work under the Contract is completed.

13.1.6.3 If Contractor is responsible for removing any pollutants from a site, then Contractor shall ensure that Any Auto, including owned, non-owned, and hired, is included within the above policies and at the required limits, to cover its automobile exposure from transporting the pollutants from the site to an approved disposal site. This coverage shall include the Motor Carrier Act Endorsement, MCS 90.

13.1.7 Proof of Insurance and Other Requirements: Endorsements and Certificates

13.1.7.1 Contractor shall not commence Work nor shall it allow any Subcontractor to commence Work under this Contract, until Contractor and its Subcontractor(s) have procured all required insurance and Contractor has delivered in duplicate to the District complete endorsements (or entire insurance policies) and certificates indicating the required coverages have been obtained, and the District has approved these documents.

13.1.7.2 Endorsements, certificates, and insurance policies shall include the following:

13.1.7.2.1 A clause stating:

"This policy shall not be canceled and the coverage amounts shall not be reduced until written notice to District, Architect, and Construction Manager stating date of the cancellation by the insurance carrier. Date of cancellation may not be less than thirty (30) days after date of mailing notice."

13.1.7.2.2 Language stating in particular those insured, extent of insurance, location and operation to which insurance applies, expiration date, to whom cancellation and reduction notice will be sent, and length of notice period.

13.1.7.2.3 All endorsements, certificates and insurance policies shall state that District, its trustees, employees and agents, the State of California, Construction Manager(s), Project Manager(s), Inspector(s) and Architect(s) are named additional

insureds under all policies except Workers' Compensation Insurance and Employers' Liability Insurance.

13.1.7.3 No policy shall be amended, canceled or modified, and the coverage amounts shall not be reduced, until Contractor or Contractor's broker has provided written notice to District, Architect, and Construction Manager stating date of the amendment, modification, cancellation or reduction, and a description of the change. Date of amendment, modification, cancellation or reduction may not be less than thirty (30) days after date of mailing notice.

13.1.7.4 Insurance written on a "claims made" basis shall be retroactive to a date that coincides with or precedes Contractor's commencement of Work, including subsequent policies purchased as renewals or replacements. Said policy is to be renewed by the Contractor and all Subcontractors for a period of five (5) years following completion of the Work or termination of this Agreement. Such insurance must have the same coverage and limits as the policy that was in effect during the term of this Agreement, and will cover the Contractor and all Subcontractors for all claims made.

13.1.7.5 Contractor's and Subcontractors' insurance policy(s) shall be primary and non-contributory to any insurance or self-insurance maintained by District, its trustees, employees and/or agents, the State of California, Construction Manager(s), Project Manager(s), Inspector(s), and/or Architect(s).

13.1.7.6 All endorsements shall waive any right to subrogation against any of the named additional insureds.

13.1.7.7 Unless otherwise stated in the Special Conditions, all of Contractor's insurance shall be with insurance companies with an A.M. Best rating of no less than **A: VII**.

13.1.7.8 The insurance requirements set forth herein shall in no way limit the Contractor's liability arising out of or relating to the performance of the Work or related activities.

13.1.7.9 Failure of Contractor and/or its Subcontractor(s) to comply with the insurance requirements herein shall be deemed a material breach of the Agreement.

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13.1.8 Insurance Policy Limits

Unless different limits are indicated in the Special Conditions, the limits of insurance shall not be less than the following amounts:

Commercial General Liability	Product Liability and Completed Operations, Fire Damage Liability – Split Limit	\$2,000,000 per occurrence; \$4,000,000 aggregate
Automobile Liability – Any Auto	Combined Single Limit	\$1,000,000
Workers' Compensation		Statutory limits pursuant to State law
Employers' Liability		\$1,000,000
Builder's Risk of (Course of Construction)		Issued for the value and scope of Work indicated herein.
Pollution Liability		\$1,000,000 per claim; \$2,000,000 aggregate

13.2 Contract Security - Bonds

13.2.1 Contractor shall furnish two surety bonds issued by a California admitted surety insurer as follows:

13.2.1.1 Performance Bond: A bond in an amount at least equal to one hundred percent (100%) of Contract Price as security for faithful performance of this Contract.

13.2.1.2 Payment Bond: A bond in an amount at least equal to one hundred percent (100%) of the Contract Price as security for payment of persons performing labor and/or furnishing materials in connection with this Contract.

13.2.2 Cost of bonds shall be included in the Bid and Contract Price.

13.2.3 All bonds related to this Project shall be in the forms set forth in these Contract Documents and shall comply with all requirements of the Contract Documents, including, without limitation, the bond forms.

14. WARRANTY/GUARANTEE/INDEMNITY

14.1 Warranty/Guarantee

14.1.1 The Contractor shall obtain and preserve for the benefit of the District, manufacturer's warranties on materials, fixtures, and equipment incorporated into the Work.

14.1.2 In addition to guarantees required elsewhere, Contractor shall, and hereby does guarantee and warrant all Work furnished on the job against all defects for a period of **ONE (1)** year after the later of the following dates, unless a longer period is provided for in the Contract Documents:

14.1.2.1 The acceptance by the District, or its agent, of the Work, subject to these General Conditions, or

14.1.2.2 The date that commissioning for the Project, if any, was completed.

At the District's sole option, Contractor shall repair or replace any and all of that Work, together with any other Work that may be displaced in so doing, that may prove defective in workmanship and/or materials within a **ONE (1)** year period from date of completion as defined above, unless a longer period is provided for in the Contract Documents, without expense whatsoever to District. In the event of failure of Contractor and/or Surety to commence and pursue with diligence said replacements or repairs within ten (10) days after being notified in writing, Contractor and Surety hereby acknowledge and agree that District is authorized to proceed to have defects repaired and made good at expense of Contractor and/or Surety who hereby agree to pay costs and charges therefore immediately on demand.

14.1.3 If, in the opinion of District, defective work creates a dangerous condition or requires immediate correction or attention to prevent further loss to District or to prevent interruption of operations of District, District will attempt to give the notice required above. If Contractor or Surety cannot be contacted or neither complies with District's request for correction within a reasonable time as determined by District, District may, notwithstanding the above provision, proceed to make any and all corrections and/or provide attentions the District believes are necessary. The costs of correction or attention shall be charged against Contractor and Surety of the guarantees provided in this Article or elsewhere in this Contract.

14.1.4 The above provisions do not in any way limit the guarantees on any items for which a longer guarantee is specified or on any items for which a manufacturer gives a guarantee for a longer period. Contractor shall furnish to District all appropriate guarantee or warranty certificates as indicated in the Specifications or upon request by District.

14.1.5 Nothing herein shall limit any other rights or remedies available to District.

14.2 Indemnity and Defense

14.2.1 To the furthest extent permitted by California law, the Contractor shall indemnify, keep and hold harmless the District, the Architect, and the Construction Manager, their consultants and separate contractors, and their respective board members, officers, representatives, contractors, agents, and employees, in both individual and official capacities ("Indemnitees"), against all suits, claims, damages, losses, and expenses, including but not limited to attorney's fees, caused by, arising out of, resulting from, or incidental to, the performance of the Work under this Contract by the Contractor, its Subcontractors, vendors, or suppliers, except to the extent caused by the sole negligence, active negligence, or willful misconduct of the Indemnitees, and/or defects in design furnished by the Architect, as found by a court or arbitrator of competent jurisdiction, in which case the Contractor's indemnification and hold harmless obligation shall be reduced by the proportion of the Indemnitees' and/or Architect's liability, and/or to any extent that would render these provisions void or unenforceable. This agreement and obligation of the Contractor shall not be construed to negate, abridge, or otherwise reduce any right or obligation of indemnity that would otherwise exist as to any party or person described herein. This indemnification, and hold harmless obligation includes, but is not limited to, any failure or alleged failure by Contractor to comply with any provision of law, any failure or alleged failure to timely and properly fulfill all of its obligations under the Contract Documents in strict accordance with their terms, and without limitation, any failure or alleged failure of Contractor's obligations regarding any stop payment notice actions or liens, including Civil Wage and Penalty Assessments and/or Orders by the California Department of Industrial Relations.

14.2.2 Contractor shall also defend, at its own expense, Indemnitees against all suits, claims, allegations, damages, losses, and expenses, including but not limited to attorneys' fees, caused by, arising out of, resulting from, or incidental to, the performance of the Work under this Contract by the Contractor, its Subcontractors, vendors, or suppliers, except to the extent caused by the sole negligence, active negligence, or willful misconduct of the Indemnitees, and/or defects in design furnished by the Architect, as found by a court or arbitrator of competent jurisdiction, in which case the Contractor's defense obligation shall be reduced by the proportion of the Indemnitees' and/or Architect's liability, and/or to any extent that would render these provisions void or unenforceable. The District shall have the right to accept or reject any legal representation that Contractor proposes to defend the Indemnitees. This obligation of defense is inclusive of fees and costs. If the Indemnitees provide their own defense due to failure to timely respond to tender of defense, rejection of tender of defense, or conflict of interest of proposed counsel, Contractor shall reimburse Indemnitees for any expenditures, including reasonable attorney's fees and costs. This agreement and obligation of the Contractor shall not be construed to negate, abridge, or otherwise reduce any right or obligation of defense that would otherwise exist as to any party or person described herein. This defense obligation includes, but is not limited to, any failure or alleged failure by Contractor to comply with any provision of law, any failure or alleged failure to timely and properly fulfill all of its obligations under the Contract Documents in strict accordance with their terms, and without limitation, any failure or alleged failure of Contractor's obligations regarding any stop payment notice actions or liens, including Civil Wage and Penalty Assessments and/or Orders by the California Department of Industrial Relations. The Contractor shall give prompt notice to the District in the event of any injury (including death), loss, or damage included herein.

14.2.3 Without limitation of the provisions herein, if the Contractor's agreement to indemnify and hold harmless the Indemnitees or its agreement to defend Indemnitees as provided herein shall be determined to be void or unenforceable, in whole or in part, it is the intention of the parties that these circumstances shall not otherwise affect the validity or enforceability of the Contractor's agreement to indemnify, defend, and hold harmless the rest of the Indemnitees, as provided herein. Further, the Contractor shall be and remain fully liable on its agreements and obligations herein to the fullest extent permitted by law.

14.2.4 Pursuant to Public Contract Code section 9201, the District shall provide timely notification to Contractor of the receipt of any third-party claim relating to this Contract. The District shall be entitled to recover its reasonable costs incurred in providing said notification.

14.2.5 In any and all claims against any of the Indemnitees by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the Contractor's indemnification obligation herein shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Contractor or any Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

14.2.6 The District may retain so much of the moneys due the Contractor as shall be considered necessary, until disposition of any such suit, claims or actions for damages or until the District, Architect and Construction Manager have received written agreement from the Contractor that they will unconditionally defend the District, Architect and Construction Manager, their officers, agents and employees, and pay any damages due by reason of settlement or judgment.

14.2.7 The defense and indemnification obligations hereunder shall survive the completion of Work, including the warranty/guarantee period, and/or the termination of the Agreement.

15. TIME

15.1 Notice to Proceed

15.1.1 District may issue a Notice to Proceed within ninety (90) days from the date of the Notice of Award. Once Contractor has received the Notice to Proceed, Contractor shall complete the Work within the period of time indicated in the Contract Documents.

15.1.2 In the event that the District desires to postpone issuing the Notice to Proceed beyond ninety (90) days from the date of the Notice of Award, it is expressly understood that with reasonable notice to the Contractor, the District may postpone issuing the Notice to Proceed. It is further expressly understood by Contractor that Contractor shall not be entitled to any claim of additional compensation as a result of the postponement of the issuance of the Notice to Proceed.

15.1.3 If the Contractor believes that a postponement of issuance of the Notice to Proceed will cause a hardship to Contractor, Contractor may terminate the Contract. Contractor's termination due to a postponement shall be by written notice to District within ten (10) days after receipt by Contractor of District's notice of postponement. It is further understood by Contractor that in the event that Contractor terminates the Contract as a result of postponement by the District, the District shall only be obligated to pay Contractor for the Work that Contractor had performed at the time of notification of postponement. Should Contractor terminate the Contract as a result of a notice of postponement, District shall have the authority to award the Contract to the next lowest responsive responsible bidder.

15.2 Computation of Time / Adverse Weather

15.2.1 The Contractor will only be allowed a time extension for Adverse Weather conditions if requested by Contractor in compliance with the time extension request procedures and only if all of the following conditions are met:

15.2.1.1 The weather conditions constitute Adverse Weather, as defined herein and further specified in the Special Conditions;

15.2.1.2 Contractor can verify that the Adverse Weather caused delays in excess of five (5) hours of the indicated labor required to complete the scheduled tasks of Work on the day affected by the Adverse Weather;

15.2.1.3 The Contractor's crew is dismissed as a result of the Adverse Weather;

15.2.1.4 Said delay adversely affects the critical path in the Construction Schedule; and

15.2.1.5 Exceeds twelve (12) days of delay per year.

15.2.2 If the aforementioned conditions are met, a non-compensable day-for-day extension will only be allowed for those days in excess of those indicated in the Special Conditions.

15.2.3 The Contractor shall work seven (7) days per week, if necessary, irrespective of inclement weather, to maintain access and the Construction Schedule, and to protect the Work under construction from the effects of Adverse Weather, all at no further cost to the District.

15.2.4 The Contract Time has been determined with consideration given to the average climate weather conditions prevailing in the County in which the Project is located.

15.3 Hours of Work

15.3.1 Sufficient Forces

Contractor and Subcontractors shall continuously furnish sufficient and competent work forces with the required levels of familiarity with the Project and skill, training and experience to ensure the prosecution of the Work in accordance with the Construction Schedule.

15.3.2 Performance During Working Hours

Work shall be performed during regular working hours as permitted by the appropriate governmental agency except that in the event of an emergency, or when required to complete the Work in accordance with job progress, Work may be performed outside of regular working hours with the advance written consent of the District and approval of any required governmental agencies.

15.3.3 No Work during State Testing

Contractor shall, at no additional cost to the District and at the District's request, coordinate its Work to not disturb District students including, without limitation, not performing any Work when students at the Site are taking State or Federally-required tests. The District or District's Representative will provide Contractor with a schedule of test dates concurrent with the District's issuance of the Notice to Proceed, or as soon as test dates are made available to the District.

15.4 Progress and Completion

15.4.1 Time of the Essence

Time limits stated in the Contract Documents are of the essence to the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

15.4.2 No Commencement Without Insurance or Bonds

The Contractor shall not commence operations on the Project or elsewhere prior to the effective date of insurance and bonds. The date of commencement of the Work shall not be changed by the effective date of such insurance or bonds. If Contractor commences Work without insurance and bonds, all Work is performed at Contractor's peril and shall not be compensable until and unless Contractor secures bonds and insurance pursuant to the terms of the Contract Documents and subject to District claim for damages.

15.5 Schedule

Contractor shall provide to District, Construction Manager, and Architect a schedule in conformance with the Contract Documents and as required in the Notice to Proceed and the Contractor's Submittals and Schedules section of these General Conditions.

15.6 Expeditious Completion

The Contractor shall proceed expeditiously with adequate forces and shall achieve Completion within the Contract Time.

16. EXTENSIONS OF TIME – LIQUIDATED DAMAGES

16.1 Liquidated Damages

Contractor and District hereby agree that the exact amount of damages for failure to complete the Work within the time specified is extremely difficult or impossible to determine. If the Work is not completed within the time specified in the Contract Documents, it is understood that the District will suffer damage. It being impractical and unfeasible to determine the amount of actual damage, it is agreed the Contractor shall pay to District as fixed and liquidated damages, and not as a penalty, the amount set forth in the Agreement for each calendar day of delay in completion. Contractor and its Surety shall be liable for the amount thereof pursuant to Government Code section 53069.85.

16.2 Excusable Delay

16.2.1 Contractor shall not be charged for liquidated damages because of any delays in completion of Work which are not the fault of Contractor or its Subcontractors, including acts of God as defined in Public Contract Code section 7105, acts of enemy, epidemics, and quarantine restrictions. Contractor shall, within five (5) calendar days of beginning of any delay, notify District in writing of causes of delay including documentation and facts explaining the delay and the direct correlation between the cause and effect. District shall review the facts and extent of any delay and shall grant extension(s) of time for completing Work when, in its judgment, the findings of fact justify an extension. Extension(s) of time shall apply only to that portion of Work affected by delay, and shall not apply to other portions of Work not so affected. An extension of time may only be granted if Contractor has timely submitted the Construction Schedule as required herein.

16.2.2 Contractor shall notify the District pursuant to the claims provisions in these General Conditions of any anticipated delay and its cause. Following submission of a claim, the District may determine whether the delay is to be considered avoidable or unavoidable, how long it continues, and to what extent the prosecution and completion of the Work might be delayed thereby.

16.2.3 In the event the Contractor requests an extension of Contract Time for unavoidable delay, such request shall be submitted in accordance with the provisions in the Contract Documents governing changes in Work. When requesting time, requests must be submitted with full justification and documentation. If the Contractor fails to submit justification, it waives its right to a time extension at a later date. Such justification must be based on the official Construction Schedule as updated at the time of occurrence of the delay or execution of Work related to any changes to the Scope of Work. Any claim for delay must include the following information as support, without limitation:

16.2.3.1 The duration of the activity relating to the changes in the Work and the resources (manpower, equipment, material, etc.) required to perform the activities within the stated duration.

16.2.3.2 Specific logical ties to the Contract Schedule for the proposed changes and/or delay showing the activity/activities in the Construction Schedule that are affected by the change and/or delay. In particular, Contractor must show an actual impact to the schedule, after making a good faith effort to mitigate the delay by rescheduling the work, by providing an analysis of the schedule ("Schedule Analysis"). Such Schedule Analysis shall describe in detail the cause and effect of the delay and the impact on the critical dates in the Project schedule. (A portion of any delay of seven (7) days or more must be provided.)

16.2.3.3 A recovery schedule must be submitted within twenty (20) calendar days of written notification to the District of causes of delay.

16.3 No Additional Compensation for Delays Within Contractor's Control

16.3.1 Contractor is aware that governmental agencies, including, without limitation, the Division of the State Architect, the Department of General Services, gas companies, electrical utility companies, water districts, and other agencies may have to approve Contractor-prepared drawings or approve a proposed installation. Accordingly, Contractor shall include in its bid, time for possible review of its drawings and for reasonable delays and damages that may be caused by such agencies. Thus, Contractor is not entitled to make a claim for damages or delays arising from the review of Contractor's drawings.

16.3.2 Contractor shall only be entitled to compensation for delay when all of the following conditions are met:

16.3.2.1 The District is responsible for the delay;

16.3.2.2 The delay is unreasonable under the circumstances involved;

16.3.2.3 The delay was not within the contemplation of the District and Contractor; and

16.3.2.4 Contractor timely complies with the claims procedure of the Contract Documents.

16.4 Float or Slack in the Schedule

Float or slack is the amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any of the activities in the schedule. Float or slack is not for the exclusive use of or benefit of either the District or the Contractor, but its use shall be determined solely by the District.

17. CHANGES IN THE WORK

17.1 No Changes Without Authorization

17.1.1 There shall be no change whatsoever in the Drawings, Specifications, or in the Work without an executed Change Order or a written Construction Change Directive authorized by the District as herein provided. District shall not be liable for the cost of any extra work or any substitutions, changes, additions, omissions, or deviations from the Drawings and Specifications unless the District's governing board has authorized the same and the cost thereof has been approved in writing by Change Order or Construction Change Directive in advance of the changed Work being performed. No extension of time for performance of the Work shall be allowed hereunder unless claim for such extension is made at the time changes in the Work are ordered, and such time duly adjusted and approved in writing in the Change Order or Construction Change Directive. Contractor shall be responsible for any costs incurred by the District for professional services and DSA fees and/or delay to the Project Schedule, if any, for DSA to review any request for changes to the DSA approved plans and specifications for the convenience of the Contractor and/or to accommodate the Contractor's means and methods. The provisions of the Contract Documents shall apply to all such changes, additions, and omissions with the same effect as if originally embodied in the Drawings and Specifications.

17.1.2 Contractor shall perform immediately all work that has been authorized by a fully executed Change Order or Construction Change Directive. Contractor shall be fully

responsible for any and all delays and/or expenses caused by Contractor's failure to expeditiously perform this Work.

17.1.3 Should any Change Order result in an increase in the Contract Price or extend the Contract Time, the cost of or length of extension in that Change Order shall be agreed to, in writing, by the District in advance of the Work by Contractor, and shall be subject to the monetary limitations set forth in Public Contract Code section 20118.4. In the event that Contractor proceeds with any change in Work without a Change Order executed by the District or Construction Change Directive, Contractor waives any claim of additional compensation or time for that additional work. Under no circumstances shall Contractor be entitled to any claim of additional compensation or time not expressly requested by Contractor in a Proposed Change Order or approved by District in an executed Change Order.

17.1.4 Contractor understands, acknowledges, and agrees that the reason for District authorization is so that District may have an opportunity to analyze the Work and decide whether the District shall proceed with the Change Order or alter the Project so that a change in Work becomes unnecessary.

17.2 Architect Authority

The Architect will have authority to order minor changes in the Work not involving any adjustment in the Contract Price, or an extension of the Contract Time, or a change that is inconsistent with the intent of the Contract Documents. These changes shall be effected by written Change Order, Construction Change Directive, by Architect's response(s) to RFI(s), or by Architect's Supplemental Instructions ("ASI").

17.3 Change Orders

17.3.1 A Change Order is a written instrument prepared and issued by the District and/or the Architect and signed by the District (as authorized by the District's Governing Board), the Contractor, the Architect, and approved by the Project Inspector (if necessary) and DSA (if necessary), stating their agreement regarding all of the following:

- 17.3.1.1** A description of a change in the Work;
- 17.3.1.2** The amount of the adjustment in the Contract Price, if any; and
- 17.3.1.3** The extent of the adjustment in the Contract Time, if any.

17.4 Construction Change Directives

17.4.1 A Construction Change Directive is a written order prepared and issued by the District, the Construction Manager, and/or the Architect and signed by the District and the Architect, directing a change in the Work. The District may, as provided by law, by Construction Change Directive and without invalidating the Contract, order changes in the Work consisting of additions, deletions, or other revisions. The adjustment to the Contract Price or Time, if any, is subject to the provisions of this section regarding Changes in the Work. If all or a portion of the Project is being funded by funds requiring approval by the State Allocation Board ("SAB"), these revisions may be subject to compensation once approval of same is received and funded by the SAB, and funds are released by the Office of Public School Construction ("OPSC"). Any dispute as to the adjustment in the Contract Price, if any, of the Construction Change Directive or timing of payment shall be resolved pursuant to the Payment and Claims and Disputes provisions herein.

17.4.2 The District may issue a Construction Change Directive in the absence of agreement on the terms of a Change Order.

17.5 Force Account Directives

17.5.1 When work, for which a definite price has not been agreed upon in advance, is to be paid for on a force account basis, all direct costs necessarily incurred and paid by the Contractor for labor, material, and equipment used in the performance of that Work, shall be subject to the approval of the District and compensation will be determined as set forth herein.

17.5.2 The District will issue a Force Account Directive to proceed with the Work on a force account basis, and a not-to-exceed budget will be established by the District.

17.5.3 All requirements regarding direct cost for labor, labor burden, material, equipment, and markups on direct costs for overhead and profit described in this section shall apply to Force Account Directives. However, the District will only pay for actual costs verified in the field by the District or its authorized representative(s) on a daily basis.

17.5.4 The Contractor shall be responsible for all cost related to the administration of Force Account Directive. The markup for overhead and profit for Contractor modifications shall be full compensation to the Contractor to administer Force Account Directive, and Contractor shall not be entitled to separately recover additional amounts for overhead and/or profit.

17.5.5 The Contractor shall notify the District or its authorized representative(s) at least twenty-four (24) hours prior to proceeding with any of the force account work. Furthermore, the Contractor shall notify the District when it has consumed eighty percent (80%) of the budget, and shall not exceed the budget unless specifically authorized in writing by the District. The Contractor will not be compensated for force account work in the event that the Contractor fails to timely notify the District regarding the commencement of force account work, or exceeding the force account budget.

17.5.6 The Contractor shall diligently proceed with the work, and on a daily basis, submit a daily force account report on a form supplied by the District no later than 5:00 p.m. each day. The report shall contain a detailed itemization of the daily labor, material, and equipment used on the force account work only. The names of the individuals performing the force account work shall be included on the daily force account reports. The type and model of equipment shall be identified and listed. The District will review the information contained in the reports, and sign the reports no later than the next work day, and return a copy of the report to the Contractor for their records. The District will not sign, nor will the Contractor receive compensation for work the District cannot verify. The Contractor will provide a weekly force account summary indicating the status of each Force Account Directive in terms of percent complete of the not-to-exceed budget and the estimated percent complete of the work.

17.5.7 In the event the Contractor and the District reach a written agreement on a set cost for the work while the work is proceeding based on a Force Account Directive, the Contractor's signed daily force account reports shall be discontinued and all previously signed reports shall be invalid.

17.6 Price Request

17.6.1 Definition of Price Request

A Price Request ("PR") is a written request prepared by the Architect requesting the Contractor to submit to the District and the Architect an estimate of the effect of a proposed change in the Work on the Contract Price and the Contract Time.

17.6.2 Scope of Price Request

A Price Request shall contain adequate information, including any necessary Drawings and Specifications, to enable Contractor to provide the cost breakdowns required herein. The Contractor shall not be entitled to any additional compensation for preparing a response to a Price Request, whether ultimately accepted or not.

17.7 Proposed Change Order

17.7.1 Definition of Proposed Change Order

A Proposed Change Order ("PCO") is a written request prepared by the Contractor requesting that the District and the Architect issue a Change Order based upon a proposed change to the Work.

17.7.2 Changes in Contract Price

A PCO shall include breakdowns and backup documentation pursuant to the revisions herein and sufficient, in the District's judgment, to validate any change in Contract Price. In no case shall Contractor or any of its Subcontractors be permitted to reserve rights for additional compensation for Change Order Work.

17.7.3 Changes in Time

A PCO shall also include any changes in time required to complete the Project. Any additional time requested shall not be the number of days to make the proposed change, but must be based upon the impact to the Construction Schedule as defined in the Contract Documents. If Contractor fails to request a time extension in a PCO, then the Contractor is thereafter precluded from requesting, and waives any right to request, additional time and/or claim a delay. In no case shall Contractor or any of its Subcontractors be permitted to reserve rights for additional time for Change Order Work. A PCO that leaves the amount of time requested blank, or states that such time requested is "to be determined", is not permitted and shall also constitute a waiver of any right to request additional time and/or claim a delay.

17.7.4 Unknown and/or Unforeseen Conditions

If there is an Allowance, then Contractor must submit a Request for Allowance Expenditure Directive, including supporting documentation as described below, to receive authorization for the release of funds from the Allowance. If cost of the unforeseen condition(s) exceed the Allowance, Contractor must submit a PCO requesting an increase in Contract Price and/or Contract Time that is based at least partially on Contractor's assertion that Contractor has encountered unknown and/or unforeseen condition(s) on the Project, then Contractor shall base the PCO on provable information that, beyond a reasonable doubt and to the District's satisfaction, demonstrates that the unknown and/or unforeseen condition(s) were actually unknown and/or unforeseen and that the condition(s) were reasonably unknown and/or unforeseen. If not, the District shall deny the PCO as unsubstantiated, and the Contractor shall complete the Project without any increase in Contract Price and/or Contract Time based on that PCO.

17.7.5 Proposed Change Order Certification

In submitting a PCO, Contractor certifies and affirms that the cost and/or time request is submitted in good faith, that the cost and/or time request is accurate and in accordance with the provisions of the Contract Documents, and the Contractor submits the cost and/or request for extension of time recognizing the significant civil penalties and treble damages which follow

from making a false claim or presenting a false claim under Government Code section 12650 et seq.

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17.8 Format for Proposed Change Order

17.8.1 The following format shall be used as applicable by the District and the Contractor (e.g. Change Orders, PCO's) to communicate proposed additions and deductions to the Contract, supported by attached documentation. Any spaces left blank will be deemed no change to cost or time.

	<u>WORK PERFORMED OTHER THAN BY CONTRACTOR</u>	<u>ADD</u>	<u>DEDUCT</u>
(a)	<u>Material</u> (attach suppliers' invoice or itemized quantity and unit cost plus sales tax)		
(b)	<u>Add Labor</u> (attach itemized hours and rates, fully encumbered)		
(c)	<u>Add Equipment</u> (attach suppliers' invoice)		
(d)	<u>Subtotal</u>		
(e)	<u>Add overhead and profit for any and all tiers of Subcontractor,</u> the total not to exceed ten percent (10%) of Item (d)		
(f)	<u>Subtotal</u>		
(g)	<u>Add Overhead and Profit for Contractor,</u> not to exceed five percent (5%) of Item (f)		
(h)	<u>Subtotal</u>		
(i)	<u>Add Bond and Insurance,</u> not to exceed one and a half percent (1.5%) of Item (h)		
(j)	<u>TOTAL</u>		
(k)	<u>Time</u> (zero unless indicated; "TBD" not permitted)	<u>Calendar Days</u>	

	<u>WORK PERFORMED BY CONTRACTOR</u>	<u>ADD</u>	<u>DEDUCT</u>
(a)	<u>Material</u> (attach itemized quantity and unit cost plus sales tax)		
(b)	<u>Add Labor</u> (attach itemized hours and rates, fully encumbered)		
(c)	<u>Add Equipment</u> (attach suppliers' invoice)		
(d)	<u>Subtotal</u>		
(e)	<u>Add Overhead and Profit for Contractor,</u> not to exceed fifteen percent (15%) of Item (d)		
(f)	<u>Subtotal</u>		
(g)	<u>Add Bond and Insurance,</u> not to exceed one and a half percent (1.5%) of Item (f)		
(h)	<u>TOTAL</u>		
(i)	<u>Time</u> (zero unless indicated; "TBD" not permitted)	<u>Calendar Days</u>	

17.8.2 Labor. Contractor shall be compensated for the costs of labor actually and directly utilized in the performance of the Work. Such labor costs shall be limited to field labor for which there is a prevailing wage rate classification. Wage rates for labor shall not exceed the prevailing wage rates in the locality of the Site and shall be in the labor classification(s) necessary for the performance of the Work. Labor costs shall exclude costs incurred by the Contractor in preparing estimate(s) of the costs of the change in the Work, in the maintenance of records relating to the costs of the change in the Work, coordination and assembly of materials and information relating to the change in the Work or performance thereof, or the supervision and other overhead and general conditions costs associated with the change in the Work or performance thereof, including but not limited to the cost for the job superintendent.

17.8.3 Materials. Contractor shall be compensated for the costs of materials necessarily and actually used or consumed in connection with the performance of the change in the Work. Costs of materials may include reasonable costs of transportation from a source closest to the

Site of the Work and delivery to the Site. If discounts by material suppliers are available for materials necessarily used in the performance of the change in the Work, they shall be credited to the District. If materials necessarily used in the performance of the change in the Work are obtained from a supplier or source owned in whole or in part by the Contractor, compensation therefor shall not exceed the current wholesale price for such materials. If, in the reasonable opinion of the District, the costs asserted by the Contractor for materials in connection with any change in the Work are excessive, or if the Contractor fails to provide satisfactory evidence of the actual costs of such materials from its supplier or vendor of the same, the costs of such materials and the District's obligation to pay for the same shall be limited to the then lowest wholesale price at which similar materials are available in the quantities required to perform the change in the Work. The District may elect to furnish materials for the change in the Work, in which event the Contractor shall not be compensated for the costs of furnishing such materials or any mark-up thereon.

17.8.4 Equipment. As a precondition to the District's duty to pay for Equipment rental or loading and transportation, Contractor shall provide satisfactory evidence of the actual costs of Equipment from the supplier, vendor or rental agency of same. Contractor shall be compensated for the actual cost of the necessary and direct use of Equipment in the performance of the change in the Work. Use of such Equipment in the performance of the change in the Work shall be compensated in increments of fifteen (15) minutes. Rental time for Equipment moved by its own power shall include time required to move such Equipment to the site of the Work from the nearest available rental source of the same. If Equipment is not moved to the Site by its own power, Contractor will be compensated for the loading and transportation costs in lieu of rental time. The foregoing notwithstanding, neither moving time or loading and transportation time shall be allowed if the Equipment is used for performance of any portion of the Work other than the change in the Work. Unless prior approval in writing is obtained by the Contractor from the Architect, the Project Inspector and the District, no costs or compensation shall be allowed for time while Construction Equipment is inoperative, idle or on standby, for any reason. Contractor shall not be entitled to an allowance or any other compensation for Equipment or tools used in the performance of change in the Work where such Equipment or tools have a replacement value of \$500.00 or less. Equipment costs claimed by the Contractor in connection with the performance of any Work shall not exceed rental rates established by distributors or construction equipment rental agencies in the locality of the Site; any costs asserted which exceed such rental rates shall not be allowed or paid. Unless otherwise specifically approved in writing by the Architect, the Project Inspector and the District, the allowable rate for the use of Equipment in connection with the Work shall constitute full compensation to the Contractor for the cost of rental, fuel, power, oil, lubrication, supplies, necessary attachments, repairs or maintenance of any kind, depreciation, storage, insurance, labor (exclusive of labor costs of the Equipment operator), and any and all other costs incurred by the Contractor incidental to the use of such Equipment.

17.8.5 Overhead and Profit. The phrase "Overhead and Profit" shall include field and office supervisors and assistants, watchperson, use of small tools, consumable, insurance other than construction bonds and insurance required herein, and general field and home office expenses.

17.9 Change Order Certification

17.9.1 All Change Orders and PCOs must include the following certification by the Contractor:

17.9.1.1 The undersigned Contractor approves the foregoing as to the changes, if any, to the Contract Price specified for each item, and as to the extension of time allowed, if any, for completion of the entire Work as stated herein, and agrees to furnish all labor, materials, and service, and perform all work necessary to complete any additional work specified for the consideration stated herein. Submission of sums which have no basis in

fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 et seq. It is understood that the changes herein to the Contract shall only be effective when approved by the governing board of the District.

17.9.1.2 It is expressly understood that the value of the extra Work or changes expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from additional time required on the Project or resulting from delay to the Project. Contractor is not entitled to separately recover amounts for overhead or other indirect costs. Any costs, expenses, damages, or time extensions not included are deemed waived.

17.10 Determination of Change Order Cost

17.10.1 The amount of the increase or decrease in the Contract Price from a Change Order, if any, shall be determined in one or more of the following ways as applicable to a specific situation and at the District's discretion:

17.10.1.1 District acceptance of a PCO;

17.10.1.2 By unit prices contained in Contractor's original bid;

17.10.1.3 By agreement between District and Contractor.

17.11 Deductive Change Orders

All deductive Change Order(s) must be prepared pursuant to the provisions herein. Where a portion of the Work is deleted from the Contract, the reasonable value of the deducted work less the value of work performed shall be considered the appropriate deduction. The value submitted on the Schedule of Values shall be used to calculate the credit amount unless the bid documentation is being held in escrow as part of the Contract Documents. Unit Prices, if any, may be used in District's discretion in calculating reasonable value. If Contractor offers a proposed amount for a deductive Change Order(s), Contractor shall include a minimum of five percent (5%) total profit and overhead to be deducted with the amount of the work of the Change Order(s). If Subcontractor work is involved, Subcontractors shall also include a minimum of five percent (5%) profit and overhead to be deducted with the amount of its deducted work. Any deviation from this provision shall not be allowed.

17.12 Addition or Deletion of Alternate Bid Item(s)

If the Bid Form and Proposal includes proposal(s) for Alternate Bid Item(s), during Contractor's performance of the Work, the District may elect to add or delete any such Alternate Bid Item(s) if not included in the Contract at the time of award. If the District elects to add or delete Alternate Bid Item(s) after Contract award, the cost or credit for such Alternate Bid Item(s) shall be as set forth in the Bid Form and Proposal unless the parties agree to a different price and the Contract Time shall be adjusted by the number of days allocated in the Contract Documents. If days are not allocated in the Contract Documents, the Contract Time shall be equitably adjusted.

17.13 Discounts, Rebates, and Refunds

For purposes of determining the cost, if any, of any change, addition, or omission to the Work hereunder, all trade discounts, rebates, refunds, and all returns from the sale of surplus materials and equipment shall accrue and be credited to the Contractor, and the Contractor shall make provisions so that such discounts, rebates, refunds, and returns may be secured, and the amount

thereof shall be allowed as a reduction of the Contractor's cost in determining the actual cost of construction for purposes of any change, addition, or omission in the Work as provided herein.

17.14 Accounting Records

With respect to portions of the Work performed by Change Orders and Construction Change Directives, the Contractor shall keep and maintain cost-accounting records satisfactory to the District, including, without limitation, Job Cost Reports as provided in these General Conditions, which shall be available to the District on the same terms as any other books and records the Contractor is required to maintain under the Contract Documents. Such records shall include without limitation hourly records for Labor and Equipment and itemized records of materials and Equipment used that day in connection with the performance of any Work. All records maintained hereunder shall be subject to inspection, review and/or reproduction by the District, the Architect or the Project Inspector upon request. In the event that the Contractor fails or refuses, for any reason, to maintain or make available for inspection, review and/or reproduction such records, the District's reasonable good faith determination of the extent of adjustment to the Contract Price shall be final, conclusive, dispositive and binding upon Contractor.

17.15 Notice Required

If the Contractor desires to make a claim for an increase in the Contract Price, or any extension in the Contract Time for completion, it shall notify the District pursuant to the provisions herein, including the Article on Claims and Disputes. No claim shall be considered unless made in accordance with this subparagraph. Contractor shall proceed to execute the Work even though the adjustment may not have been agreed upon. Any change in the Contract Price or extension of the Contract Time resulting from such claim shall be authorized by a Change Order.

17.16 Applicability to Subcontractors

Any requirements under this Article shall be equally applicable to Change Orders or Construction Change Directives issued to Subcontractors by the Contractor to the extent as required by the Contract Documents.

17.17 Alteration to Change Order Language

Contractor shall not alter Change Orders or reserve time in Change Orders. Change Orders altered in violation of this provision, if in conflict with the terms set forth herein, shall be construed in accordance with the terms set forth herein. Contractor shall execute finalized Change Orders and proceed under the provisions herein with proper notice.

17.18 Failure of Contractor to Execute Change Order

Contractor shall be in default of the Contract if Contractor fails to execute a Change Order when the Contractor agrees with the addition and/or deletion of the Work in that Change Order.

18. REQUEST FOR INFORMATION

18.1 Any Request for Information shall reference all applicable Contract Document(s), including Specification section(s), detail(s), page number(s), drawing number(s), and sheet number(s), etc. The Contractor shall make suggestions and interpretations of the issue raised by each Request for Information. A Request for Information cannot modify the Contract Price,

Contract Time, or the Contract Documents. Upon request by the District, Contractor shall provide an electronic copy of the Request for Information in addition to the hard copy.

18.2 The Contractor shall be responsible for any costs incurred for professional services that District may deduct from any amounts owing to the Contractor, if a Request for Information requests an interpretation or decision of a matter where the information sought is equally available to the party making the request. District, at its sole discretion, shall deduct from and/or invoice Contractor for all the professional services arising herein.

19. PAYMENTS

19.1 Contract Price

The Contract Price is stated in the Agreement and, including authorized adjustments, is the total amount payable by the District to the Contractor for performance of the Work under the Contract Documents.

19.2 Applications for Progress Payments

19.2.1 Procedure for Applications for Progress Payments

19.2.1.1 Application for Progress Payment

19.2.1.1.1 Not before the fifth (5th) day of each calendar month during the progress of the Work, Contractor shall submit to the District and the Architect an itemized Application for Payment for operations completed in accordance with the Schedule of Values. Such application shall be notarized, if required, and supported by the following or each portion thereof unless waived by the District in writing:

19.2.1.1.1.1 The amount paid to the date of the Application to the Contractor, to all its Subcontractors, and all others furnishing labor, material, or equipment for its Contract;

19.2.1.1.1.2 The amount being requested under the Application for Payment by the Contractor on its own behalf and separately stating the amount requested on behalf of each of the Subcontractors and all others furnishing labor, material, and equipment under the Contract;

19.2.1.1.1.3 The balance that will be due to each of such entities after said payment is made;

19.2.1.1.1.4 A certification that the As-Built Drawings and annotated Specifications are current;

19.2.1.1.1.5 Itemized breakdown of work done for the purpose of requesting partial payment;

19.2.1.1.1.6 An updated and acceptable construction schedule in conformance with the provisions herein;

19.2.1.1.1.7 The additions to and subtractions from the Contract Price and Contract Time;

19.2.1.1.1.8 A total of the retentions held;

19.2.1.1.1.9 Material invoices, evidence of equipment purchases, rentals, and other support and details of cost as the District may require from time to time;

19.2.1.1.1.10 The percentage of completion of the Contractor's Work by line item;

19.2.1.1.1.11 Schedule of Values updated from the preceding Application for Payment;

19.2.1.1.1.12 A duly completed and executed conditional waiver and release upon progress payment compliant with Civil Code section 8132 from the Contractor and each subcontractor of any tier and supplier to be paid from the current progress payment;

19.2.1.1.1.13 A duly completed and executed unconditional waiver and release upon progress payment compliant with Civil Code section 8134 from the Contractor and each subcontractor of any tier and supplier that was paid from the previous progress payment(s); and

19.2.1.1.1.14 A certification by the Contractor of the following:

The Contractor warrants title to all Work performed as of the date of this payment application has been completed in accordance with the Contract Documents for the Project. The Contractor further warrants that all amounts have been paid for work which previous Certificates for Payment were issued and payments received and all Work performed as of the date of this payment application is free and clear of liens, claims, security interests, or encumbrances in favor of the Contractor, Subcontractors, material and equipment suppliers, workers, or other persons or entities making a claim by reason of having provided labor, materials, and equipment relating to the Work, except those of which the District has been informed. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 et seq.

19.2.1.1.1.15 The Contractor shall be subject to the False Claims Act set forth in Government Code section 12650 et seq. for information provided with any Application for Progress Payment.

19.2.1.1.1.16 All remaining certified payroll records ("CPR(s)") for each journeyman, apprentice, worker, or other employee employed by the Contractor and/or each Subcontractor in connection with the Work for the period of the Application for Payment. As indicated herein, the District shall not make any payment to Contractor until:

19.2.1.1.1.16.1 Contractor and/or its Subcontractor(s) provide electronic CPRs weekly for all weeks any journeyman, apprentice, worker or other employee was employed in connection with the Work directly to the DIR, or within ten (10) days of any request by the District or the DIR, and

19.2.1.1.1.16.2 Any delay in Contractor and/or its Subcontractor(s) providing CPRs in a timely manner may directly delay the Contractor's payment.

19.2.1.1.2 Applications received after June 20th will not be paid until the second week of July and applications received after December 12th will not be paid until the first week of January.

19.2.2 Prerequisites for Progress Payments

19.2.2.1 First Payment Request: The following items, if applicable, must be completed before the District will accept and/or process the Contractor's first payment request:

- 19.2.2.1.1** Installation of the Project sign;
- 19.2.2.1.2** Installation of field office;
- 19.2.2.1.3** Installation of temporary facilities and fencing;
- 19.2.2.1.4** Schedule of Values;
- 19.2.2.1.5** Contractor's Construction Schedule;
- 19.2.2.1.6** Schedule of unit prices, if applicable;
- 19.2.2.1.7** Submittal Schedule;
- 19.2.2.1.8** Receipt by Architect of all submittals due as of the date of the payment application;
- 19.2.2.1.9** Copies of necessary permits;
- 19.2.2.1.10** Copies of authorizations and licenses from governing authorities;
- 19.2.2.1.11** Initial progress report;
- 19.2.2.1.12** Surveyor qualifications;
- 19.2.2.1.13** Written acceptance of District's survey of rough grading, if applicable;
- 19.2.2.1.14** List of all Subcontractors, with names, license numbers, telephone numbers, and Scope of Work;
- 19.2.2.1.15** All bonds and insurance endorsements; and
- 19.2.2.1.16** Resumes of Contractor's project manager, and if applicable, job site secretary, record documents recorder, and job site superintendent.

19.2.2.2 Second Payment Request: The District will not process the second payment request until and unless all submittals and Shop Drawings have been accepted for review by the Architect.

19.2.2.3 No Waiver of Criteria: Any payments made to Contractor where criteria set forth herein have not been met shall not constitute a waiver of said criteria by District. Instead, such payment shall be construed as a good faith effort by District to resolve differences so Contractor may pay its Subcontractors and suppliers. Contractor agrees that failure to submit such items may constitute a breach of contract by Contractor and may subject Contractor to termination.

19.3 Progress Payments

19.3.1 District's Approval of Application for Payment

19.3.1.1 Upon receipt of an Application for Payment, The District shall act in accordance with both of the following:

19.3.1.1.1 Each Application for Payment shall be reviewed by the District as soon as practicable after receipt for the purpose of determining that the Application for Payment is a proper Application for Payment.

19.3.1.1.2 Any Application for Payment determined not to be a proper Application for Payment suitable for payment shall be returned to the Contractor as soon as practicable, but not later than seven (7) days, after receipt. An Application for Payment returned pursuant to this paragraph shall be accompanied by a document setting forth in writing the reasons why the Application for Payment is not proper. The number of days available to the District to make a payment without incurring interest pursuant to this section shall be reduced by the number of days by which the District exceeds this seven-day return requirement.

19.3.1.1.3 An Application for Payment shall be considered properly executed if funds are available for payment of the Application for Payment, and payment is not delayed due to an audit inquiry by the financial officer of the District.

19.3.1.2 The District's review of the Contractor's Application for Payment will be based on the District's and the Architect's observations at the Site and the data comprising the Application for Payment that the Work has progressed to the point indicated and that, to the best of the District's and the Architect's knowledge, information, and belief, the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to:

19.3.1.2.1 Observation of the Work for general conformance with the Contract Documents,

19.3.1.2.2 Results of subsequent tests and inspections,

19.3.1.2.3 Minor deviations from the Contract Documents correctable prior to completion, and

19.3.1.2.4 Specific qualifications expressed by the Architect.

19.3.1.3 District's approval of the certified Application for Payment shall be based on Contractor complying with all requirements for a fully complete and valid certified Application for Payment.

19.3.2 Payments to Contractor

19.3.2.1 Within thirty (30) days after approval of the Application for Payment, Contractor shall be paid a sum equal to ninety-five percent (95%) of the value of the Work performed (as verified by Architect and Inspector and certified by Contractor) up to the last day of the previous month, less the aggregate of previous payments and amount to be withheld. The value of the Work completed shall be Contractor's best estimate. No inaccuracy or error in said estimate shall operate to release the Contractor, or any Surety upon any bond, from damages arising from such Work, or from the District's right to enforce each and every provision of this Contract, and the District shall have the right subsequently to correct any error made in any estimate for payment.

19.3.2.2 The Contractor shall not be entitled to have any payment requests processed, or be entitled to have any payment made for Work performed, so long as any lawful or

proper direction given by the District concerning the Work, or any portion thereof, remains incomplete.

19.3.2.3 If the District fails to make any progress payment within thirty (30) days after receipt of an undisputed and properly submitted Application for Payment from the Contractor, the District shall pay interest to the Contractor equivalent to the legal rate set forth in subdivision (a) of Section 685.010 of the Code of Civil Procedure.

19.3.3 No Waiver

No payment by District hereunder shall be interpreted so as to imply that District has inspected, approved, or accepted any part of the Work. Notwithstanding any payment, the District may enforce each and every provision of this Contract. The District may correct or require correction of any error subsequent to any payment.

19.4 Decisions to Withhold Payment

19.4.1 Reasons to Withhold Payment

The District may withhold payment in whole, or in part, to the extent reasonably necessary to protect the District if, in the District's opinion, the representations to the District required herein cannot be made. The District may withhold payment, in whole, or in part, to such extent as may be necessary to protect the District from loss because of, but not limited to any of the following:

19.4.1.1 Defective Work not remedied within **FORTY-EIGHT (48)** hours of written notice to Contractor.

19.4.1.2 Stop Payment Notices or other liens served upon the District as a result of the Contract. Contractor agrees that the District may withhold up to 125% of the amount claimed in the Stop Payment Notice to answer the claim and to provide for the District's reasonable cost of any litigation pursuant to the stop payment notice.

19.4.1.3 Liquidated damages assessed against the Contractor.

19.4.1.4 The cost of completion of the Contract if there exists a reasonable doubt that the Work can be completed for the unpaid balance of the Contract Price or by the completion date.

19.4.1.5 Damage to the District or other contractor(s).

19.4.1.6 Unsatisfactory prosecution of the Work by the Contractor.

19.4.1.7 Failure to store and properly secure materials.

19.4.1.8 Failure of the Contractor to submit, on a timely basis, proper, sufficient, and acceptable documentation required by the Contract Documents, including, without limitation, a Construction Schedule, Schedule of Submittals, Schedule of Values, Monthly Progress Schedules, Shop Drawings, Product Data and samples, Proposed product lists, executed Change Orders, and/or verified reports.

19.4.1.9 Failure of the Contractor to maintain As-Built Drawings.

19.4.1.10 Erroneous estimates by the Contractor of the value of the Work performed, or other false statements in an Application for Payment.

19.4.1.11 Unauthorized deviations from the Contract Documents.

19.4.1.12 Failure of the Contractor to prosecute the Work in a timely manner in compliance with the Construction Schedule, established progress schedules, and/or completion dates.

19.4.1.13 Failure to provide acceptable electronic certified payroll records, as required by the Labor Code, by these Contract Documents, or by written request; for each journeyman, apprentice, worker, or other employee employed by the Contractor and/or by each Subcontractor in connection with the Work for the period of the Application for Payment or if payroll records are delinquent or inadequate.

19.4.1.14 Failure to properly pay prevailing wages as required in Labor Code section 1720 et seq., failure to comply with any other Labor Code requirements, and/or failure to comply with labor compliance monitoring and enforcement by the DIR.

19.4.1.15 Allowing an unregistered subcontractor, as described in Labor Code section 1725.5, to engage in the performance of any work under this Contract.

19.4.1.16 Failure to comply with any applicable federal statutes and regulations regarding minimum wages, withholding, payrolls and basic records, apprentice and trainee employment requirements, equal employment opportunity requirements, Copeland Act requirements, Davis-Bacon Act and related requirements, Contract Work Hours and Safety Standards Act requirements, if applicable.

19.4.1.17 Failure to properly maintain or clean up the Site.

19.4.1.18 Failure to timely indemnify, defend, or hold harmless the District.

19.4.1.19 Any payments due to the District, including but not limited to payments for failed tests, utilities changes, or permits.

19.4.1.20 Failure to pay Subcontractor(s) or supplier(s) as required by law and by the Contract Documents.

19.4.1.21 Failure to pay any royalty, license or similar fees.

19.4.1.22 Contractor is otherwise in breach, default, or in substantial violation of any provision of this Contract.

19.4.1.23 Failure to perform any implementation and/or monitoring required by any SWPPP for the Project and/or the imposition of any penalties or fines therefore whether imposed on the District or Contractor.

19.4.2 Reallocation of Withheld Amounts

19.4.2.1 District may, in its discretion, apply any withheld amount to pay outstanding claims or obligations as defined herein. In so doing, District shall make such payments on behalf of Contractor. If any payment is so made by District, then that amount shall be considered a payment made under Contract by District to Contractor and District shall not be liable to Contractor for any payment made in good faith. These payments may be made

without prior judicial determination of claim or obligation. District will render Contractor an accounting of funds disbursed on behalf of Contractor.

19.4.2.2 If Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents or fails to perform any provision thereof, District may, after **FORTY-EIGHT (48)** hours' written notice to the Contractor and, without prejudice to any other remedy, make good such deficiencies. The District shall adjust the total Contract Price by reducing the amount thereof by the cost of making good such deficiencies. If District deems it inexpedient to correct Work that is damaged, defective, or not done in accordance with Contract provisions, an equitable reduction in the Contract Price (of at least one hundred fifty percent (150%) of the estimated reasonable value of the nonconforming Work) shall be made therefor.

19.4.3 Payment After Cure

When Contractor removes the grounds for declining approval, payment shall be made for amounts withheld because of them. No interest shall be paid on any retainage or amounts withheld due to the failure of the Contractor to perform in accordance with the terms and conditions of the Contract Documents.

19.5 Subcontractor Payments

19.5.1 Payments to Subcontractors

No later than seven (7) days after receipt, or pursuant to Business and Professions Code section 7108.5 and Public Contract Code section 7107, the Contractor shall pay to each Subcontractor, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to its Sub-subcontractors in a similar manner.

19.5.2 No Obligation of District for Subcontractor Payment

The District shall have no obligation to pay, or to see to the payment of, money to a Subcontractor except as may otherwise be required by law.

19.5.3 Joint Checks

District shall have the right in its sole discretion, if necessary for the protection of the District, to issue joint checks made payable to the Contractor and Subcontractors and/or material or equipment suppliers. The joint check payees shall be responsible for the allocation and disbursement of funds included as part of any such joint payment. In no event shall any joint check payment be construed to create any contract between the District and a Subcontractor of any tier, or a material or equipment supplier, any obligation from the District to such Subcontractor or a material or equipment supplier, or rights in such Subcontractor or a material or equipment supplier against the District.

20. COMPLETION OF THE WORK

20.1 Completion

20.1.1 District will accept completion of Contract and have the Notice of Completion recorded when the entire Work shall have been completed to the satisfaction of District.

20.1.2 The Work may only be accepted as complete by action of the governing board of the District.

20.1.3 District, at its sole option, may accept completion of Contract and have the Notice of Completion recorded when the entire Work shall have been completed to the satisfaction of District, except for minor corrective items, as distinguished from incomplete items. If Contractor fails to complete all minor corrective items within fifteen (15) days after the date of the District's acceptance of completion, District shall withhold from the final payment one hundred fifty percent (150%) of an estimate of the amount sufficient to complete the corrective items, as determined by District, until the item(s) are completed.

20.1.4 At the end of the 15-day period, if there are any items remaining to be corrected, District may elect to proceed as provided herein related to adjustments to Contract Price, and/or District's right to perform the Work of the Contractor.

20.2 Close-Out/Certification Procedures

20.2.1 Punch List

The Contractor shall notify the Architect when Contractor considers the Work complete. Upon notification, Architect will prepare a list of minor items to be completed or corrected ("Punch List"). The Contractor and/or its Subcontractors shall proceed promptly to complete and correct items on the Punch List. Failure to include an item on Punch List does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

20.2.2 Close-Out/Certification Requirements

20.2.2.1 Utility Connections

Buildings shall be connected to water, gas, sewer, and electric services, complete and ready for use. Service connections shall be made and existing services reconnected.

20.2.2.2 Record Drawings and Record Specifications

20.2.2.2.1 Contractor shall provide exact Record Drawings of the Work ("As-Builts") and Record Specifications upon completion of the Project and as a condition precedent to approval of final payment.

20.2.2.2.2 Contractor shall obtain the Inspector's approval of the corrected prints and employ a competent draftsman to transfer the Record Drawings information to the most current version of AutoCAD that is, at that time, currently utilized for plan check submission by either the District, the Architect, OPSC, and/or DSA, and print a complete set of transparent sepias. When completed, Contractor shall deliver corrected sepias and diskette/CD/other data storage device acceptable to District with AutoCAD file to the District.

20.2.2.2.3 Contractor is liable and responsible for any and all inaccuracies in the Record Drawings and Record Specifications, even if inaccuracies become evident at a future date.

20.2.2.3 Maintenance Manuals: Contractor shall prepare all operation and maintenance manuals and date as indicated in the Specifications.

20.2.2.4 Source Programming: Contractor shall provide all source programming for all items in the Project.

20.2.2.5 Verified Reports: Contractor shall completely and accurately fill out and file forms DSA 6-C or DSA 152 (or current form), as appropriate. Refer to section 4-336 and section 4-343 of Part 1, Title 24 of the California Code of Regulations.

20.3 Final Inspection

20.3.1 Contractor shall comply with Punch List procedures as provided herein, and maintain the presence of a Project Superintendent and Project Manager until the Punch List is complete to ensure proper and timely completion of the Punch List. Under no circumstances shall Contractor demobilize its forces prior to completion of the Punch List without District's prior written approval. Upon receipt of Contractor's written notice that all of the Punch List items have been fully completed and the Work is ready for final inspection and acceptance, Architect and Project Inspector will inspect the Work and shall submit to Contractor and District a final inspection report noting the Work, if any, required in order to complete in accordance with the Contract Documents. Absent unusual circumstances, this report shall consist of the Punch List items not yet satisfactorily completed.

20.3.2 Upon Contractor's completion of all items on the Punch List and any other uncompleted portions of the Work, the Contractor shall notify the District and Architect, who shall again inspect such Work. If the Architect finds the Work complete and acceptable under the Contract Documents, the Architect will notify Contractor, who shall then jointly submit to the Architect and the District its final Application for Payment.

20.3.3 Final Inspection Requirements

20.3.3.1 Before calling for final inspection, Contractor shall determine that the following have been performed:

20.3.3.1.1 The Work has been completed.

20.3.3.1.2 All life safety items are completed and in working order.

20.3.3.1.3 Mechanical and electrical Work are complete and tested, fixtures are in place, connected, and ready for tryout.

20.3.3.1.4 Electrical circuits scheduled in panels and disconnect switches labeled.

20.3.3.1.5 Painting and special finishes complete.

20.3.3.1.6 Doors complete with hardware, cleaned of protective film, relieved of sticking or binding, and in working order.

20.3.3.1.7 Tops and bottoms of doors sealed.

20.3.3.1.8 Floors waxed and polished as specified.

20.3.3.1.9 Broken glass replaced and glass cleaned.

20.3.3.1.10 Grounds cleared of Contractor's equipment, raked clean of debris, and trash removed from Site.

20.3.3.1.11 Work cleaned, free of stains, scratches, and other foreign matter, and damaged and broken material replaced.

20.3.3.1.12 Finished and decorative work shall have marks, dirt, and superfluous labels removed.

20.3.3.1.13 Final cleanup, as provided herein.

20.4 Costs of Multiple Inspections

More than two (2) requests of the District to make a final inspection shall be considered an additional service of District, Architect, Construction Manager, and/or Project Inspector, and all subsequent costs will be invoiced to Contractor and if funds are available, withheld from remaining payments.

20.5 Partial Occupancy or Use Prior to Completion

20.5.1 District's Rights to Occupancy

The District may occupy or use any completed or partially completed portion of the Work at any stage, and such occupancy shall not constitute the District's Final Acceptance of any part of the Work. Neither the District's Final Acceptance, the making of Final Payment, any provision in Contract Documents, nor the use or occupancy of the Work, in whole or in part, by District shall constitute acceptance of Work not in accordance with the Contract Documents nor relieve the Contractor or the Contractor's Performance Bond Surety from liability with respect to any warranties or responsibility for faulty or defective Work or materials, equipment and workmanship incorporated therein. In the event that the District occupies or uses any completed or partially completed portion of the Work, the Contractor shall remain responsible for payments, security, maintenance, heat, utilities, damage to the Work, insurance, the period for correction of the Work, and the commencement of warranties required by the Contract Documents unless the Contractor requests in writing, and the District agrees, to otherwise divide those responsibilities. Any dispute as to responsibilities shall be resolved pursuant to the Claims and Disputes provisions herein, with the added provision that during the dispute process, the District shall have the right to occupy or use any portion of the Work that it needs or desires to use.

20.5.2 Inspection Prior to Occupancy or Use

Immediately prior to partial occupancy or use, the District, the Contractor, and the Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

20.5.3 No Waiver

Unless otherwise agreed upon, partial or entire occupancy or use of a portion or portions of the Work shall not constitute beneficial occupancy or acceptance of the Work not complying with the requirements of the Contract Documents.

21. FINAL PAYMENT AND RETENTION

21.1 Final Payment

Upon receipt and approval of a valid and final Application for Payment, the Architect will issue a final Certificate of Payment. The District shall thereupon jointly inspect the Work and either accept the Work as complete or notify the Architect and the Contractor in writing of reasons why the Work

is not complete. Upon acceptance of the Work of the Contractor as fully complete by the Governing Board of the District (that, absent unusual circumstances, will occur when the Punch List items have been satisfactorily completed), the District shall record a Notice of Completion with the County Recorder, and the Contractor shall, upon receipt of final payment from the District, pay the amount due Subcontractors.

21.2 Prerequisites for Final Payment

The following conditions must be fulfilled prior to Final Payment:

21.2.1 A full release of all Stop Payment Notices served in connection with the Work shall be submitted by Contractor.

21.2.2 A duly completed and executed conditional waiver and release upon final payment compliant with Civil Code section 8136, from the Contractor and each subcontractor of any tier and supplier to be paid from the final payment.

21.2.3 A duly completed and executed unconditional waiver and release upon progress payment compliant with Civil Code section 8134, from the Contractor and each subcontractor of any tier and supplier that was paid from the previous progress payments.

21.2.4 A duly completed and executed Document 00 65 19.26, "AGREEMENT AND RELEASE OF ANY AND ALL CLAIMS" from the Contractor.

21.2.5 The Contractor shall have made all corrections to the Work that are required to remedy any defects therein, to obtain compliance with the Contract Documents or any requirements of applicable codes and ordinances, or to fulfill any of the orders or directions of District required under the Contract Documents.

21.2.6 Each Subcontractor shall have delivered to the Contractor all written guarantees, warranties, applications, and bonds required by the Contract Documents for its portion of the Work.

21.2.7 Contractor must have completed all requirements set forth under "Close-Out/Certification Procedures," including, without limitation, submission of an approved set of complete Record Drawings.

21.2.8 Architect shall have issued its written approval that final payment can be made.

21.2.9 The Contractor shall have delivered to the District all manuals and materials required by the Contract Documents, which must be approved by the District.

21.2.10 The Contractor shall have completed final clean-up as provided herein.

21.3 Retention

21.3.1 The retention, less any amounts disputed by the District or that the District has the right to withhold pursuant to provisions herein, shall be paid:

21.3.1.1 After approval by the Architect of the Application and Certificate of Payment,

21.3.1.2 After the satisfaction of the conditions set forth herein, and

21.3.1.3 After forty-five (45) days after the recording of the Notice of Completion by District.

21.3.2 No interest shall be paid on any retention, or on any amounts withheld due to a failure of the Contractor to perform, in accordance with the terms and conditions of the Contract Documents, except as provided to the contrary in any Escrow Agreement between the District and the Contractor pursuant to Public Contract Code section 22300.

21.4 Substitution of Securities

The District will permit the substitution of securities in accordance with the provisions of Public Contract Code section 22300.

22. UNCOVERING OF WORK

If a portion of the Work is covered without Inspector or Architect approval or not in compliance with the Contract Documents, it must, if required in writing by the District, the Project Inspector, or the Architect, be uncovered for the Project Inspector's or the Architect's observation and be corrected, replaced, and/or recovered at the Contractor's expense without change in the Contract Price or Contract Time.

23. NONCONFORMING WORK AND CORRECTION OF WORK

23.1 Nonconforming Work

23.1.1 Contractor shall promptly remove from Premises all Work identified by District as failing to conform to the Contract Documents whether incorporated or not. Contractor shall promptly replace and re-execute its own Work to comply with the Contract Documents without additional expense to the District and shall bear the expense of making good all work of other contractors destroyed or damaged by any removal or replacement pursuant hereto and/or any delays to the District or other Contractors caused thereby.

23.1.2 If Contractor does not remove Work that District has identified as failing to conform to the Contract Documents within a reasonable time, not to exceed **FORTY-EIGHT (48)** hours, District may remove it and may store any material at Contractor's expense. If Contractor does not pay expense(s) of that removal within ten (10) days' time thereafter, District may, upon ten (10) days' written notice, sell any material at auction or at private sale and shall deduct all costs and expenses incurred by the District and/or District may withhold those amounts from payment(s) to Contractor.

23.2 Correction of Work

23.2.1 Correction of Rejected Work

Pursuant to the notice provisions herein, the Contractor shall immediately correct the Work rejected by the District, the Architect, or the Project Inspector as failing to conform to the requirements of the Contract Documents, whether observed before or after Completion and whether or not fabricated, installed, or completed. The Contractor shall bear costs of correcting the rejected Work, including additional testing, inspections, and compensation for the Inspector's or the Architect's services and expenses made necessary thereby.

23.2.2 One-Year Warranty Corrections

If, within one (1) year after the date of Completion of the Work or a designated portion thereof, or after the date for commencement of warranties established hereunder, or by the terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the District to do so. This period of one (1) year shall be extended with respect to portions of the Work first performed after Completion

by the period of time between Completion and the actual performance of the Work. This obligation hereunder shall survive acceptance of the Work under the Contract and termination of the Contract. The District shall give such notice promptly after discovery of the condition.

23.3 District's Right to Perform Work

23.3.1 If the Contractor should neglect to prosecute the Work properly or fail to perform any provisions of this contract, the District, after **FORTY-EIGHT (48)** hours written notice to the Contractor, may, without prejudice to any other remedy it may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor.

23.3.2 If it is found at any time, before or after completion of the Work, that Contractor has varied from the Drawings and/or Specifications, including, but not limited to, variation in material, quality, form, or finish, or in the amount or value of the materials and labor used, District may require at its option:

23.3.2.1 That all such improper Work be removed, remade or replaced, and all work disturbed by these changes be made good by Contractor at no additional cost to the District;

23.3.2.2 That the District deduct from any amount due Contractor the sum of money equivalent to the difference in value between the work performed and that called for by the Drawings and Specifications; or

23.3.2.3 That the District exercise any other remedy it may have at law or under the Contract Documents, including but not limited to the District hiring its own forces or another contractor to replace the Contractor's nonconforming Work, in which case the District shall either issue a deductive Change Order, a Construction Change Directive, or invoice the Contractor for the cost of that work. Contractor shall pay any invoices within thirty (30) days of receipt of same or District may withhold those amounts from payment(s) to Contractor.

24. TERMINATION AND SUSPENSION

24.1 District's Right to Terminate Contractor for Cause

24.1.1 Grounds for Termination: The District, in its sole discretion, may terminate the Contract and/or terminate the Contractor's right to perform the work of the Contract based upon any of the following:

24.1.1.1 Contractor refuses or fails to execute the Work or any separable part thereof with sufficient diligence as will ensure its completion within the time specified or any extension thereof, or

24.1.1.2 Contractor fails to complete said Work within the time specified or any extension thereof, or

24.1.1.3 Contractor persistently fails or refused to perform Work or provide material of sufficient quality as to be in compliance with Contract Documents; or

24.1.1.4 Contractor persistently or repeatedly refuses fails, except in cases for which extension of time is provided, to supply enough properly skilled workers or proper materials to complete the Work in the time specified; or

24.1.1.5 Contractor fails to make prompt payment to Subcontractors, or for material, or for labor; or

24.1.1.6 Contractor persistently disregards laws, or ordinances, or instructions of District; or

24.1.1.7 Contractor fails to supply labor, including that of Subcontractors, that is sufficient to prosecute the Work or that can work in harmony with all other elements of labor employed or to be employed on the Work; or

24.1.1.8 Contractor or its Subcontractor(s) is/are otherwise in breach, default, or in substantial violation of any provision of this Contract, including but not limited to a lapse in licensing or registration.

24.1.2 Notification of Termination

24.1.2.1 Upon the occurrence at District's sole determination of any of the above conditions, District may, without prejudice to any other right or remedy, serve written notice upon Contractor and its Surety of District's termination of this Contract and/or the Contractor's right to perform the work of the Contract. This notice will contain the reasons for termination. Unless, within three (3) days after the service of the notice, any and all condition(s) shall cease, and any and all violation(s) shall cease, or arrangement satisfactory to District for the correction of the condition(s) and/or violation(s) be made, this Contract shall cease and terminate. Upon Termination, Contractor shall not be entitled to receive any further payment until the entire Work is finished.

24.1.2.2 Upon Termination, District may immediately serve written notice of tender upon Surety whereby Surety shall have the right to take over and perform this Contract only if Surety:

24.1.2.2.1 Within three (3) days after service upon it of the notice of tender, gives District written notice of Surety's intention to take over and perform this Contract; and

24.1.2.2.2 Commences performance of this Contract within three (3) days from date of serving of its notice to District.

24.1.2.3 Surety shall not utilize Contractor in completing the Project if the District notifies Surety of the District's objection to Contractor's further participation in the completion of the Project. Surety expressly agrees that any contractor which Surety proposes to fulfill Surety's obligations is subject to District's approval. District's approval shall not be unreasonably withheld, conditioned or delayed.

24.1.2.4 If Surety fails to notify District or begin performance as indicated herein, District may take over the Work and execute the Work to completion by any method it may deem advisable at the expense of Contractor and/or its Surety. Contractor and/or its Surety shall be liable to District for any excess cost or other damages the District incurs thereby. Time is of the essence in this Contract. If the District takes over the Work as herein provided, District may, without liability for so doing, take possession of and utilize in completing the Work such materials, appliances, plan, and other property belonging to Contractor as may be on the Site of the Work, in bonded storage, or previously paid for.

24.1.3 Effect of Termination

24.1.3.1 Contractor shall, only if ordered to do so by the District, immediately remove from the Site all or any materials and personal property belonging to Contractor that have not been incorporated in the construction of the Work, or which are not in place in the Work. The District retains the right, but not the obligation, to keep and use any materials and personal property belonging to Contractor that have not been incorporated in the construction of the Work, or which are not in place in the Work. The Contractor and its Surety shall be liable upon the performance bond for all damages caused to the District by reason of the Contractor's failure to complete the Contract.

24.1.3.2 In the event that the District shall perform any portion of, or the whole of the Work, pursuant to the provisions of the General Conditions, the District shall not be liable nor account to the Contractor in any way for the time within which, or the manner in which, the Work is performed by the District or for any changes the District may make in the Work or for the money expended by the District in satisfying claims and/or suits and/or other obligations in connection with the Work.

24.1.3.3 In the event that the Contract is terminated for any reason, no allowances or compensation will be granted for the loss of any anticipated profit by the Contractor or any impact or impairment of Contractor's bonding capacity.

24.1.3.4 If the expense to the District to finish the Work exceeds the unpaid Contract Price, Contractor and Surety shall pay difference to District within twenty-one (21) days of District's request.

24.1.3.5 The District shall have the right (but shall have no obligation) to assume and/or assign to a general contractor or construction manager or other third party who is qualified and has sufficient resources to complete the Work, the rights of the Contractor under its subcontracts with any or all Subcontractors. In the event of an assumption or assignment by the District, no Subcontractor shall have any claim against the District or third party for Work performed by Subcontractor or other matters arising prior to termination of the Contract. The District or any third party, as the case may be, shall be liable only for obligations to the Subcontractor arising after assumption or assignment. Should the District so elect, the Contractor shall execute and deliver all documents and take all steps, including the legal assignment of its contractual rights, as the District may require, for the purpose of fully vesting in the District the rights and benefits of its Subcontractor under Subcontracts or other obligations or commitments. All payments due the Contractor hereunder shall be subject to a right of offset by the District for expenses and damages suffered by the District as a result of any default, acts, or omissions of the Contractor. Contractor must include this assignment provision in all of its contracts with its Subcontractors.

24.1.3.6 The foregoing provisions are in addition to and not in limitation of any other rights or remedies available to District.

24.1.4 Emergency Termination of Public Contracts Act of 1949

24.1.4.1 This Contract is subject to termination as provided by sections 4410 and 4411 of the Government Code of the State of California, being a portion of the Emergency Termination of Public Contracts Act of 1949.

24.1.4.1.1 Section 4410 of the Government Code states:

In the event a national emergency occurs, and public work, being performed by contract, is stopped, directly or indirectly, because of the freezing or diversion of materials, equipment or labor, as the result of an order or a proclamation of the President of the United States, or of an order of any federal authority, and the circumstances or conditions are such that it is impracticable within a reasonable time to proceed with a substantial portion of the work, then the public agency and the contractor may, by written agreement, terminate said contract.

24.1.4.1.2 Section 4411 of the Government Code states:

Such an agreement shall include the terms and conditions of the termination of the contract and provision for the payment of compensation or money, if any, which either party shall pay to the other or any other person, under the facts and circumstances in the case.

24.1.4.2 Compensation to the Contractor shall be determined at the sole discretion of District on the basis of the reasonable value of the Work done, including preparatory work. As an exception to the foregoing and at the District's discretion, in the case of any fully completed separate item or portion of the Work for which there is a separate previously submitted unit price or item on the accepted schedule of values, that price shall control. The District, at its sole discretion, may adopt the Contract Price as the reasonable value of the work done or any portion thereof.

24.2 **Termination of Contractor for Convenience**

24.2.1 District in its sole discretion may terminate the Contract upon three (3) days' written notice to the Contractor. Under a termination for convenience, the District retains the right to all the options available to the District if there is a termination for cause. In case of a termination for convenience, the Contractor shall have no claims against the District except:

24.2.1.1 The actual cost for labor, materials, and services performed that is unpaid and adequately documented through timesheets, invoices, receipts, or otherwise, and

24.2.1.2 Five percent (5%) of the total cost of work performed as of the date of termination, or five percent (5%) of the value of the Work yet to be performed, whichever is less. This five percent (5%) amount shall be full compensation for all Contractor's and Subcontractor(s)' mobilization and/or demobilization costs and any anticipated loss profits resulting from termination of the Contractor for convenience.

24.3 **Suspension of Work**

24.3.1 District in its sole discretion may suspend, delay or interrupt the Work in whole or in part for such period of time as the District may determine upon three (3) days written notice to the Contractor.

24.3.1.1 An adjustment may be made for changes in the cost of performance of the Work caused by any such suspension, delay or interruption. No adjustment shall be made to the extent:

24.3.1.1.1 That performance is, was or would have been so suspended, delayed or interrupted by another cause for which Contractor is responsible; or

24.3.1.1.2 That an equitable adjustment is made or denied under another provision of the Contract; or

24.3.1.1.3 That the suspension of Work was the direct or indirect result of Contractor's failure to perform any of its obligations hereunder.

24.3.1.2 Any adjustments in cost of performance may have a fixed or percentage fee as provided in the section on Format for Proposed Change Order herein. This amount shall be full compensation for all Contractor's and its Subcontractor(s)' changes in the cost of performance of the Contract caused by any such suspension, delay or interruption.

25. CLAIMS PROCESS

25.1 Performance during Claim Process

Contractor and its subcontractors shall continue to perform its Work under the Contract and shall not cause a delay of the Work during any dispute, claim, negotiation, mediation, or arbitration proceeding, except by written agreement by the District.

25.2 Definition of Claim

25.2.1 Pursuant to Public Contract Code section 9204, the term "Claim" means a separate demand by the Contractor sent by registered mail or certified mail with return receipt requested, for one or more of the following:

25.2.1.1 A time extension, including without limitation, for relief of damages or penalties for delay assessed by the District under the Contract;

25.2.1.2 Payment by the District of money or damages arising from work done by, or on behalf of, the Contractor pursuant to the Contract and payment of which is not otherwise expressly provided for or to which Contractor is not otherwise entitled to; or

25.2.1.3 An amount of payment disputed by the District.

25.3 Claims Presentation

25.3.1 If Contractor intends to apply for an increase in the Contract Price or Contract Time for any reason including, without limitation, the acts of District or its agents, Contractor shall, within thirty (30) days after the event giving rise to the Claim, give notice of the Claim in writing, including an itemized statement of the details and amounts of its Claim for any increase in the Contract Price or Contract Time, including a Schedule Analysis and any and all other documentation substantiating Contractor's claimed damages. Otherwise, Contractor shall have waived and relinquished its dispute against the District and Contractor's claims for compensation or an extension of time shall be forfeited and invalidated. Likewise, failure to timely submit a claim and the requisite supporting documentation shall constitute a waiver of such claim.

25.3.2 The Claim shall identify:

25.3.2.1 The issues, events, conditions, circumstances and/or causes giving rise to the dispute, and shall show, in detail, the cause and effect of same;

25.3.2.2 The pertinent dates and/or durations and actual and/or anticipated effects on the Contract Price, Contract Schedule milestones and/or Contract Time adjustments;

25.3.2.3 The line-item costs for labor, material, and/or equipment, if applicable; or

25.3.2.4 A request by Contractor, if any, to waive the claims procedure under Public Contract Code section 9204 and proceed directly to the commencement of a civil action or binding arbitration.

25.3.3 The Claim shall include the following certification by the Contractor:

25.3.3.1 The undersigned Contractor certifies under penalty of perjury that the attached dispute is made in good faith; that the supporting data is accurate and complete to the best of my knowledge and belief; that the amount requested accurately reflects the adjustment for which Contractor believes the District is liable; and that I am duly authorized to certify the dispute on behalf of the Contractor.

25.3.3.2 Furthermore, Contractor understands that the value of the attached dispute expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from the Work performed on the Project, additional time required on the Project and/or resulting from delay to the Project. Contractor may not separately recover for overhead or other indirect costs. Any costs, expenses, damages, or time extensions not included are deemed waived.

25.4 **Claim Resolution pursuant to Public Contract Code section 9204**

25.4.1 **STEP 1:**

25.4.1.1 Upon receipt of a Claim by registered or certified mail, return receipt requested, including the documents necessary to substantiate it, the District shall conduct a reasonable review of the Claim and, within a period **not to exceed 45 days**, shall provide the Contractor a written statement identifying what portion of the Claim is disputed and what portion is undisputed. Upon receipt of a Claim, the District and Contractor may, **by mutual agreement, extend the time period** to provide a written statement. If the District needs approval from its governing body to provide the Contractor a written statement identifying the disputed portion and the undisputed portion of the Claim, and the governing body does not meet within the 45 days or within the mutually agreed to extension of time following receipt of Claim sent by registered mail or certified mail, return receipt requested, the District shall have **up to three (3) days following the next duly publicly noticed meeting of the governing body after the 45-day period, or extension**, expires to provide Contractor a written statement identifying the disputed portion and the undisputed portion.

25.4.1.1.1 Any payment due on an undisputed portion of the Claim shall be processed and made within 60 days after the District issues its written statement. Amounts not paid in a timely manner as required by this section, section 25.4, shall bear interest at seven percent (7%) per annum.

25.4.1.2 Upon receipt of a Claim, the parties may mutually agree to waive, in writing, mediation and proceed directly to the commencement of a civil action or binding arbitration, as applicable. In this instance, District and Contractor must comply with the sections below regarding Public Contract Code section 20104 et seq. and Government Code Claim Act Claims.

25.4.1.3 If the District fails to issue a written statement, or to otherwise meet the time requirements of this section, this shall result in the Claim being deemed rejected in its entirety. A Claim that is denied by reason of the District's failure to have responded to a Claim, or its failure to otherwise meet the time requirements of this section, shall not constitute an adverse finding with regard to the merits of the Claim or the responsibility or qualifications of Contractor.

25.4.2 STEP 2:

25.4.2.1 If Contractor disputes the District's written response, or if the District fails to respond to a Claim within the time prescribed, Contractor may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the District shall schedule a meet and confer conference within 30 days for settlement of the dispute. Within 10 business days following the conclusion of the meet and confer conference, if the Claim or any portion of the Claim remains in dispute, the District shall provide the Contractor a written statement identifying the portion of the Claim that remains in dispute and the portion that is undisputed.

25.4.2.1.1 Any payment due on an undisputed portion of the Claim shall be processed and made within 60 days after the District issues its written statement. Amounts not paid in a timely manner as required by this section, section 25.4, shall bear interest at seven percent (7%) per annum.

25.4.3 STEP 3:

25.4.3.1 Any disputed portion of the Claim, as identified by Contractor in writing, shall be submitted to nonbinding mediation, with the District and Contractor sharing the associated costs equally. The District and Contractor shall mutually agree to a mediator within 10 business days after the disputed portion of the Claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the Claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. If mediation is unsuccessful, the parts of the Claim remaining in dispute shall be subject to applicable procedures outside this section.

25.4.3.1.1 For purposes of this section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.

25.4.3.2 Unless otherwise agreed to by the District and Contractor in writing, the mediation conducted pursuant to this section shall excuse any further obligation under Public Contract Code section 20104.4 to mediate after litigation has been commenced.

25.4.4 STEP 4:

25.4.4.1 If mediation under this section does not resolve the parties' dispute, the District may, but does not require arbitration of disputes under private arbitration or the Public Works Contract Arbitration Program.

25.5 Subcontractor Pass-Through Claims

25.5.1 If a subcontractor or a lower tier subcontractor lacks legal standing to assert a claim against a District because privity of contract does not exist, the contractor may present to the District a Claim on behalf of a subcontractor or lower tier subcontractor. A subcontractor may request in writing, either on his or her own behalf or on behalf of a lower tier subcontractor, that Contractor present a Claim for work which was performed by the subcontractor or by a lower tier subcontractor on behalf of the subcontractor. The subcontractor requesting that the Claim be presented to the District shall furnish reasonable documentation to support the Claim.

25.5.2 Within 45 days of receipt of this written request from a subcontractor, Contractor shall notify the subcontractor in writing as to whether the Contractor presented the Claim to the District and, if Contractor did not present the Claim, provide the subcontractor with a statement of the reasons for not having done so.

25.5.3 The Contractor shall bind all its Subcontractors to the provisions of this section and will hold the District harmless against Claims by Subcontractors.

25.6 Government Code Claim Act Claim

25.6.1 If a claim, or any portion thereof, remains in dispute upon satisfaction of all applicable Claim Resolution requirements, including those pursuant to Public Contract Code section 9204, the Contractor shall comply with all claims presentation requirements as provided in Chapter 1 (commencing with section 900) and Chapter 2 (commencing with section 910) of Part 3 of Division 3.6 of Title 1 of Government Code as a condition precedent to the Contractor's right to bring a civil action against the District. For purposes of those provisions, the running of the time within which a claim must be presented to the District shall be tolled from the time Contractor submits its written Claim until the time the Claim is denied, including any time utilized by any applicable meet and confer process.

25.7 Claim Resolution pursuant to Public Contract Code section 20104 et seq.

25.7.1 In the event of a disagreement between the parties as to performance of the Work, the interpretation of this Contract, or payment or nonpayment for Work performed or not performed, the parties shall attempt to resolve all claims of three hundred seventy-five thousand dollars (\$375,000) or less which arise between Contractor and District by those procedures set forth in Public Contract Code section 20104, et seq., to the extent applicable.

25.7.1.1 Contractor shall file with the District any written Claim, including the documents necessary to substantiate it, upon the application for final payment.

25.7.1.2 For claims of less than fifty thousand dollars (\$50,000), the District shall respond in writing within forty-five (45) days of receipt of the Claim or may request in writing within thirty (30) days of receipt of the Claim any additional documentation supporting the Claim or relating to defenses or claims the District may have against the Contractor.

25.7.1.2.1 If additional information is required, it shall be requested and provided by mutual agreement of the parties.

25.7.1.2.2 District's written response to the documented Claim shall be submitted to the Contractor within fifteen (15) days after receipt of the further documentation or within a period of time no greater than that taken by the Contractor to produce the additional information, whichever is greater.

25.7.1.3 For claims of over fifty thousand dollars (\$50,000) and less than or equal to three hundred seventy-five thousand dollars (\$375,000), the District shall respond in writing to all written Claims within sixty (60) days of receipt of the claim, or may request, in writing, within thirty (30) days of receipt of the Claim any additional documentation supporting the Claim or relating to defenses or claims the District may have against the Contractor.

25.7.1.3.1 If additional information is required, it shall be requested and provided upon mutual agreement of the District and the Contractor.

25.7.1.3.2 The District's written response to the Claim, as further documented, shall be submitted to the Contractor within thirty (30) days after receipt of the further

documentation, or within a period of time no greater than that taken by the Contractor to produce the additional information or requested documentation, whichever is greater.

25.7.1.4 If Contractor disputes the District's written response, or the District fails to respond within the time prescribed, Contractor may so notify the District, in writing, either within fifteen (15) days of receipt of the District's response or within fifteen (15) days of the District's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the District shall schedule a meet and confer conference within thirty (30) days for settlement of the dispute.

25.7.1.5 Following the meet and confer conference, if the Claim or any portion of it remains in dispute, the Contractor may file a claim as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions the running of the time within which a claim must be filed shall be tolled from the time the Contractor submits its written Claim until the time the Claim is denied, including any period of time utilized by the meet and confer process.

25.7.1.6 For any civil action filed to resolve claims filed pursuant to this section, within sixty (60) days, but no earlier than thirty (30) days, following the filing of responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within fifteen (15) days by both parties of a disinterested third person as mediator, shall be commenced within thirty (30) days of the submittal, and shall be concluded within fifteen (15) days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court or by stipulation of both parties. If the parties fail to select a mediator within the 15-day period, any party may petition the court to appoint the mediator.

25.7.1.7 If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of the Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of that code. The Civil Discovery Act of 1986, (Article 3 (commencing with Section 2016) of Chapter 3 of Title 3 of part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.

25.7.1.8 The District shall not fail to pay money as to any portion of a Claim which is undisputed except as otherwise provided in the Contract Documents. In any suit filed pursuant to this section, the District shall pay interest due at the legal rate on any arbitration award or judgment. Interest shall begin to accrue on the date the suit is filed in a court of law.

25.7.2 Contractor shall bind its Subcontractors to the provisions of this Section and will hold the District harmless against disputes by Subcontractors.

25.8 Claim Resolution Non-Applicability

25.8.1 The procedures for dispute and claim resolutions set forth in this Article shall not apply to the following:

25.8.1.1 Personal injury, wrongful death or property damage claims;

25.8.1.2 Latent defect or breach of warranty or guarantee to repair;

25.8.1.3 Stop payment notices;

25.8.1.4 District's rights set forth in the Article on Suspension and Termination;

25.8.1.5 Disputes arising out of labor compliance enforcement by the Department of Industrial Relations; or

25.8.1.6 District rights and obligations as a public entity set forth in applicable statutes; provided, however, that penalties imposed against a public entity by statutes, including, but not limited to, Public Contract Code sections 20104.50 and 7107, shall be subject to the Claim Resolution requirements provided in this Article.

25.9 Attorney's Fees

25.9.1 Should litigation be necessary to enforce any terms or provisions of this Agreement, then each party shall bear its own litigation and collection expenses, witness fees, court costs and attorney's fees.

26. STATE LABOR, WAGE & HOUR, APPRENTICE, AND RELATED PROVISIONS

26.1 Labor Compliance and Enforcement

Since this Project is subject to labor compliance and enforcement by the Department of Industrial Relations ("DIR"), Contractor specifically acknowledges and understands that it shall perform the Work of this Agreement while complying with all the applicable provisions of Division 2, Part 7, Chapter 1, of the Labor Code and Title 8 of the California Code of Regulations, including, without limitation, the requirement that the Contractor and all Subcontractors shall timely furnish complete and accurate electronic certified payroll records directly to the DIR. The District may not issue payment if this requirement is not met.

26.2 Wage Rates, Travel, and Subsistence

26.2.1 Pursuant to the provisions of Article 2 (commencing at section 1770), Chapter 1, Part 7, Division 2, of the Labor Code, the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work in the locality in which this public work is to be performed for each craft, classification, or type of worker needed to execute this Contract are on file at the District's principal office and copies will be made available to any interested party on request. Contractor shall obtain and post a copy of these wage rates at the job site.

26.2.2 Holiday and overtime work, when permitted by law, shall be paid for at the general prevailing rate of per diem wages for holiday and overtime work on file with the Director of the Department of Industrial Relations, unless otherwise specified. The holidays upon which those rates shall be paid need not be specified by the District, but shall be all holidays recognized in the applicable collective bargaining agreement. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code.

26.2.3 Contractor shall pay and shall cause to be paid each worker engaged in Work on the Project the general prevailing rate of per diem wages determined by the Director of the Department of Industrial Relations, regardless of any contractual relationship which may be alleged to exist between Contractor or any Subcontractor and such workers.

26.2.4 If during the period this bid is required to remain open, the Director of the Department of Industrial Relations determines that there has been a change in any prevailing rate of per diem wages in the locality in which the Work under the Contract is to be performed,

such change shall not alter the wage rates in the Notice to Bidders or the Contract subsequently awarded.

26.2.5 Pursuant to Labor Code section 1775, Contractor shall, as a penalty to District, forfeit the statutory amount (believed by the District to be currently up to two hundred dollars (\$200) for each calendar day, or portion thereof, for each worker paid less than the prevailing rates, determined by the District and/or the Director, for the work or craft in which that worker is employed for any public work done under Contract by Contractor or by any Subcontractor under it. The difference between such prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing wage rate shall be paid to each worker by Contractor.

26.2.6 Any worker employed to perform Work on the Project, which Work is not covered by any classification listed in the general prevailing wage rate of per diem wages determined by the Director, shall be paid not less than the minimum rate of wages specified therein for the classification which most nearly corresponds to Work to be performed by him, and such minimum wage rate shall be retroactive to time of initial employment of such person in such classification.

26.2.7 Pursuant to Labor Code section 1773.1, per diem wages are deemed to include employer payments for health and welfare, pension, vacation, travel time, subsistence pay, and apprenticeship or other training programs authorized by Labor Code section 3093, and similar purposes.

26.2.8 Contractor shall post at appropriate conspicuous points on the Site of Project, a schedule showing all determined minimum wage rates and all authorized deductions, if any, from unpaid wages actually earned. In addition, Contractor shall post a sign-in log for all workers and visitors to the Site, a list of all subcontractors of any tier on the Site, and the required Equal Employment Opportunity poster(s).

26.3 Hours of Work

26.3.1 As provided in article 3 (commencing at section 1810), chapter 1, part 7, division 2, of the Labor Code, eight (8) hours of labor shall constitute a legal day's work. The time of service of any worker employed at any time by Contractor or by any Subcontractor on any subcontract under this Contract upon the Work or upon any part of the Work contemplated by this Contract shall be limited and restricted by Contractor to eight (8) hours per day, and forty (40) hours during any one week, except as hereinafter provided. Notwithstanding the provisions hereinabove set forth, Work performed by employees of Contractor in excess of eight (8) hours per day and forty (40) hours during any one week, shall be permitted upon this public work upon compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half times the basic rate of pay.

26.3.2 Contractor shall keep and shall cause each Subcontractor to keep an accurate record showing the name of and actual hours worked each calendar day and each calendar week by each worker employed by Contractor in connection with the Work or any part of the Work contemplated by this Contract. The record shall be kept open at all reasonable hours to the inspection of District and to the Division of Labor Standards Enforcement of the DIR.

26.3.3 Pursuant to Labor Code section 1813, Contractor shall as a penalty to the District forfeit the statutory amount (believed by the District to be currently twenty-five dollars (\$25)) for each worker employed in the execution of this Contract by Contractor or by any Subcontractor for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any one calendar day and forty (40) hours in any one calendar week in violation of the provisions of article 3 (commencing at section 1810), chapter 1, part 7, division 2, of the Labor Code.

26.3.4 Any Work necessary to be performed after regular working hours, or on Sundays or other holidays shall be performed without additional expense to the District.

26.4 **Payroll Records**

26.4.1 Contractor shall upload, and shall cause each Subcontractor performing any portion of the Work under this Contract to upload, an accurate and complete certified payroll record ("CPR") electronically using DIR's eCPR System by uploading the CPRs by electronic XML file or entering each record manually using the DIR's iform (or current form) online on a weekly basis and within ten (10) days of any request by the District or Labor Commissioner at <http://www.dir.ca.gov/Public-Works/Certified-Payroll-Reporting.html> or current application and URL, showing the name, address, social security number, work classification, straight-time, and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by the Contractor and/or each Subcontractor in connection with the Work.

26.4.1.1 The CPRs enumerated hereunder shall be filed directly with the DIR on a weekly basis or to the requesting party, whether the District or DIR, within ten (10) days after receipt of each written request. The CPRs from the Contractor and each Subcontractor for each week shall be provided on or before Wednesday of the week following the week covered by the CPRs. District may not make any payment to Contractor until:

26.4.1.1.1 Contractor and/or its Subcontractor(s) provide CPRs acceptable to the DIR; and

26.4.1.1.2 Any delay in Contractor and/or its Subcontractor(s) providing CPRs to the DIR in a timely manner may directly delay Contractor's payment.

26.4.2 All CPRs shall be available for inspection at all reasonable hours at the principal office of Contractor on the following basis:

26.4.2.1 A certified copy of an employee's CPR shall be made available for inspection or furnished to the employee or his/her authorized representative on request.

26.4.2.2 CPRs shall be made available for inspection or furnished upon request to a representative of District, Division of Labor Standards Enforcement, Division of Apprenticeship Standards, and/or the DIR.

26.4.2.3 CPRs shall be made available upon request by the public for inspection or copies thereof made; provided, however, that a request by the public shall be made through the District, Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested CPRs have not been provided pursuant to the provisions herein, the requesting party shall, prior to being provided the records, reimburse the costs of preparation by Contractor, Subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of Contractor.

26.4.3 Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by District, Division of Apprenticeship Standards, or Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address, and social security number. The name and address of Contractor awarded Contract or performing Contract shall not be marked or obliterated.

26.4.4 Contractor shall inform District of the location of the records enumerated hereunder, including the street address, city, and county, and shall, within five (5) working days, provide a notice of change of location and address.

26.4.5 In the event of noncompliance with the requirements of this section, Contractor shall have ten (10) days in which to comply subsequent to receipt of written notice specifying in what respects Contractor must comply with this section. Should noncompliance still be evident after the ten (10) day period, Contractor shall, as a penalty to District, forfeit up to one hundred dollars (\$100) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Labor Commissioner, these penalties shall be withheld from progress payments then due.

26.4.6 **[RESERVED]**

26.5 **[RESERVED]**

26.6 **Apprentices**

26.6.1 Contractor acknowledges and agrees that, if this Contract involves a dollar amount greater than or a number of working days greater than that specified in Labor Code section 1777.5, then this Contract is governed by the provisions of Labor Code Section 1777.5. It shall be the responsibility of Contractor to ensure compliance with this Article and with Labor Code section 1777.5 for all apprenticeship occupations.

26.6.2 Apprentices of any crafts or trades may be employed and, when required by Labor Code section 1777.5, shall be employed provided they are properly registered in full compliance with the provisions of the Labor Code.

26.6.3 Every such apprentice shall be paid the standard wage paid to apprentices under the regulations of the craft or trade at which he/she is employed, and shall be employed only at the work of the craft or trade to which she/he is registered.

26.6.4 Only apprentices, as defined in section 3077 of the Labor Code, who are in training under apprenticeship standards and written apprentice agreements under chapter 4 (commencing at section 3070), division 3, of the Labor Code, are eligible to be employed. The employment and training of each apprentice shall be in accordance with the provisions of the apprenticeship standards and apprentice agreements under which he/she is training.

26.6.5 Pursuant to Labor Code section 1777.5, if that section applies to this Contract as indicated above, Contractor and any Subcontractors employing workers in any apprenticeable craft or trade in performing any Work under this Contract shall apply to the applicable joint apprenticeship committee for a certificate approving the Contractor or Subcontractor under the applicable apprenticeship standards and fixing the ratio of apprentices to journeymen employed in performing the Work.

26.6.6 Pursuant to Labor Code section 1777.5, if that section applies to this Contract as indicated above, Contractor and any Subcontractor may be required to make contributions to the apprenticeship program.

26.6.7 If Contractor or Subcontractor willfully fails to comply with Labor Code section 1777.5, then, upon a determination of noncompliance by the Administrator of Apprenticeship, it shall:

26.6.7.1 Be denied the right to bid on any subsequent project for one (1) year from the date of such determination;

26.6.7.2 Forfeit as a penalty to District the full amount as stated in Labor Code section 1777.7. Interpretation and enforcement of these provisions shall be in accordance with the rules and procedures of the California Apprenticeship Council and under the authority of the Chief of the Division of Apprenticeship Standards.

26.6.8 Contractor and all Subcontractors shall comply with Labor Code section 1777.6, which section forbids certain discriminatory practices in the employment of apprentices.

26.6.9 Contractor shall become fully acquainted with the law regarding apprentices prior to commencement of the Work. Special attention is directed to sections 1777.5, 1777.6, and 1777.7 of the Labor Code, and title 8, California Code of Regulations, section 200 et seq. Questions may be directed to the State Division of Apprenticeship Standards, 455 Golden Gate Avenue, 9th floor, San Francisco, California 94102.

26.7 Non-Discrimination

26.7.1 Contractor herein agrees not to discriminate in its recruiting, hiring, promotion, demotion, or termination practices on the basis of race, religious creed, national origin, ancestry, sex, age, or physical handicap in the performance of this Contract and to comply with the provisions of the California Fair Employment and Housing Act as set forth in part 2.8 of division 3 of the California Government Code, commencing at section 12900; the Federal Civil Rights Act of 1964, as set forth in Public Law 88-352, and all amendments thereto; Executive Order 11246; and all administrative rules and regulations found to be applicable to Contractor and Subcontractor.

26.7.2 Special requirements for Federally Assisted Construction Contracts: During the performance of this Contract, Contractor agrees to incorporate in all subcontracts the provisions set forth in Chapter 60-1.4(b) of Title 41 published in Volume 33 No. 104 of the Federal Register dated May 28, 1968.

26.8 Labor First Aid

Contractor shall maintain emergency first aid treatment for Contractor's workers on the Project which complies with the Federal Occupational Safety and Health Act of 1970 (29 U.S.C. § 651 et seq.) and the California Occupational Safety and Health Act of 1973 (Lab. Code, § 6300 et seq.; 8 Cal. Code of Regs., § 330 et seq.).

27. [RESERVED]

28. MISCELLANEOUS

28.1 Assignment of Antitrust Actions

28.1.1 Section 7103.5(b) of the Public Contract Code states:

In entering into a public works contract or subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, which assignment shall be made and become effective at the time the awarding body tenders final payment to the Contractor, without further acknowledgment by the parties.

28.1.2 Section 4552 of the Government Code states:

In submitting a bid to a public purchasing body, the bidder offers and agrees that if the bid is accepted, it will assign to the purchasing body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, materials, or services by the bidder for sale to the purchasing body pursuant to the bid. Such assignment shall be made and become effective at the time the purchasing body tenders final payment to the bidder.

28.1.3 Section 4553 of the Government Code states:

If an awarding body or public purchasing body receives, either through judgment or settlement, a monetary recovery for a cause of action assigned under this chapter, the assignor shall be entitled to receive reimbursement for actual legal costs incurred and may, upon demand, recover from the public body any portion of the recovery, including treble damages, attributable to overcharges that were paid by the assignor but were not paid by the public body as part of the bid price, less the expenses incurred in obtaining that portion of the recovery.

28.1.4 Section 4554 of the Government Code states:

Upon demand in writing by the assignor, the assignee shall, within one year from such demand, reassign the cause of action assigned under this part if the assignor has been or may have been injured by the violation of law for which the cause of action arose and (a) the assignee has not been injured thereby, or (b) the assignee declines to file a court action for the cause of action.

28.1.5 Under this Article, "public purchasing body" is District and "bidder" is Contractor.

28.2 **Excise Taxes**

If, under Federal Excise Tax Law, any transaction hereunder constitutes a sale on which a Federal Excise Tax is imposed and the sale is exempt from such Federal Excise Tax because it is a sale to a State or Local Government for its exclusive use, District, upon request, will execute documents necessary to show (1) that District is a political subdivision of the State for the purposes of such exemption, and (2) that the sale is for the exclusive use of District. No Federal Excise Tax for such materials shall be included in any Contract Price.

28.3 **Taxes**

Contract Price is to include any and all applicable sales taxes or other taxes that may be due in accordance with section 7051 et seq. of the Revenue and Taxation Code, Regulation 1521 of the State Board of Equalization or any other tax code that may be applicable.

28.4 **Shipments**

All shipments must be F.O.B. destination to Site or sites, as indicated in the Contract Documents. There must be no charge for containers, packing, unpacking, drayage, or insurance. The total Contract Price shall be all inclusive (including sales tax) and no additional costs of any type will be considered.

28.5 **Compliance with Government Reporting Requirements**

If this Contract is subject to federal or other governmental reporting requirements because of federal or other governmental financing in whole or in part for the Project of which it is part, or for any other reason, Contractor shall comply with those reporting requirements at the request of the District at no additional cost.

END OF DOCUMENT

02/02/18

SPECIAL CONDITIONS

1. Mitigation Measures

Follow the Storm Water Pollution Prevention Plan (SWPPP). No EIR/No Mitigation Negative Declaration required.

2. Modernization Projects

2.1 Access. Access to the school buildings and entry to buildings, classrooms, restrooms, mechanical rooms, electrical rooms, or other rooms, for construction purposes, must be coordinated with District and onsite District personnel before Work is to start. Unless agreed to otherwise in writing, only a school custodian will be allowed to unlock and lock doors in existing building(s). The custodian will be available only while school is in session. If a custodian is required to arrive before 7:00 a.m. or leave after 3:30 p.m. to accommodate Contractor's Work, the overtime wages for the custodian will be paid by the Contractor, unless at the discretion of the District, other arrangements are made in advance.

2.2 Keys. Upon request, the District may, at its own discretion, provide keys to the school site for the convenience of the Contractor. The Contractor agrees to pay all expenses to re-key the entire school site and all other affected District buildings if the keys are lost or stolen, or if any unauthorized party obtains a copy of the key or access to the school.

2.3 Maintaining Services. The Contractor is advised that Work is to be performed in spaces regularly scheduled for instruction. Interruption and/or periods of shutdown of public access, electrical service, water service, lighting, or other utilities shall be only as arranged in advance with the District. Contractor shall provide temporary services to all facilities interrupted by Contractor's Work.

2.4 Maintaining Utilities. The Contractor shall maintain in operation during duration of Contract, drainage lines, storm drains, sewers, water, gas, electrical, steam, and other utility service lines within working area.

2.5 Confidentiality. Contractor shall maintain the confidentiality of all information, documents, programs, procedures and all other items that Contractor encounters while performing the Work. This requirement shall be ongoing and shall survive the expiration or termination of this Contract and specifically includes, without limitation, all student, parent, and employee disciplinary information and health information.

2.6 Work during Instructional Time. By submitting its bid, Contractor affirms that Work may be performed during ongoing instruction in existing facilities. If so, Contractor agrees to cooperate to the best of its ability to minimize any disruption to school operations and any use of school facilities by the public up to, and including, rescheduling specific work activities, at no additional cost to District.

2.7 No Work during Student Testing. Contractor shall, at no additional cost to the District and at the District's request, coordinate its Work to not disturb District students including, without limitation, not performing any Work when students at the Site are taking State or Federally-required tests.

3. Badge Policy for Contractors

All Contractors doing work for the District will provide their workers with identification badges. These badges will be worn by all members of the Contractor's staff who are working in a District facility.

3.1 Badges must be filled out in full and contain the following information:

- 3.1.1 Name of Contractor
- 3.1.2 Name of Employee
- 3.1.3 Contractor's address and phone number

3.2 Badges are to be worn when the Contractor or his/her employees are on site and must be visible at all times. Contractors must inform their employees that they are required to allow District employees, the Architect, the Construction Manager, the Program Manager, or the Project Inspector to review the information on the badges upon request.

3.3 Continued failure to display identification badges as required by this policy may result in the individual being removed from the Project or assessment of fines against the Contractor.

4. Substitution for Specified Items

4.1 Whenever in the Specifications any materials, process, or article is indicated or specified by grade, patent, or proprietary name, or by name of manufacturer, that Specification shall be deemed to be followed by the words "or equal." Contractor may, unless otherwise stated, offer any material, process, or article that shall be substantially equal or better in every respect to that so indicated or specified.

4.1.1 If the material, process, or article offered by Contractor is not, in the opinion of the District, substantially equal or better in every respect to that specified, then Contractor shall furnish the material, process, or article specified in the Specifications without any additional compensation or change order.

4.1.2 This provision shall not be applicable with respect to any material, product, thing or service for which District made findings and gave notice in accordance with Public Contract Code section 3400(c); therefore, Contractor shall not be entitled to request a substitution with respect to those materials, products or services.

4.2 A request for a substitution shall be submitted as follows:

4.2.1 Contractor shall notify the District in writing of any request for a substitution at least ten (10) days prior to bid opening as indicated in the Instructions to Bidders.

4.2.2 Requests for Substitutions after award of the Contract shall be submitted within thirty-five (35) days of the date of the Notice of Award.[A1]

4.3 Within 35 days after the date of the Notice of Award, Contractor shall provide data substantiating a request for substitution of "an equal" item, including but not limited to the following:

4.3.1 All variations of the proposed substitute from the material specified including, but not limited to, principles of operation, materials, or construction finish, thickness or gauge of materials, dimensions, weight, and tolerances;

4.3.2 Available maintenance, repair or replacement services;

4.3.3 Increases or decreases in operating, maintenance, repair, replacement, and spare parts costs;

4.3.4 Whether or not acceptance of the substitute will require other changes in the Work (or in work performed by the District or others under Contract with the District); and

4.3.5 The time impact on any part of the Work resulting directly or indirectly from acceptance of the proposed substitute.

4.4 No substitutions shall be made until approved, in writing, by the District. The burden of proof as to equality of any material, process, or article shall rest with Contractor. The Contractor warrants that if substitutes are approved:

4.4.1 The proposed substitute is equal or superior in all respects to that specified, and that such proposed substitute is suitable and fit for the intended purpose and will perform adequately the function and achieve the results called for by the general design and the Contract Documents;

4.4.2 The Contractor provides the same warranties and guarantees for the substitute that would be provided for that specified;

4.4.3 The Contractor shall be fully responsible for the installation of the substitute and any changes in the Work required, either directly or indirectly, because of the acceptance of such substitute, with no increase in Contract Price or Contract Time. Incidental changes or extra component parts required to accommodate the substitute will be made by the Contractor without a change in the Contract Price or Contract Time;

4.4.4 The Contractor shall be responsible for any re-design costs occasioned by District's acceptance and/or approval of any substitute; and

4.4.5 The Contractor shall, in the event that a substitute is less costly than that specified, credit the District with one hundred percent (100%) of the net difference between the substitute and the originally specified material. In this event, the Contractor agrees to execute a deductive Change Order to reflect that credit.

4.5 In the event Contractor furnishes a material, process, or article more expensive than that specified, the difference in the cost of that material, process, or article so furnished shall be borne by Contractor.

4.6 In no event shall the District be liable for any increase in Contract Price or Contract Time due to any claimed delay in the evaluation of any proposed substitute or in the acceptance or rejection of any proposed substitute.

4.7 Contractor shall be responsible for any costs the District incurs for professional services, DSA fees, or delay to the Project Schedule, if applicable, while DSA reviews changes for the convenience of Contractor and/or to accommodate Contractor's means and methods. District may deduct those costs from any amounts owing to the Contractor for the review of the request for substitution, even if the request for substitution is not approved. District, at its sole discretion, shall deduct from the payments due to and/or invoice Contractor for all the professional services and/or DSA fees or delay to the Project Schedule, if applicable, while DSA reviews changes for the convenience of Contractor and/or to accommodate Contractor's means and methods arising herein.

5. Weather Days[A2]

Delays due to Adverse Weather conditions will only be permitted in compliance with the provisions in the General Conditions and only if the number of days of Adverse Weather exceeds the following parameters and Contractor can verify that the excess days of Adverse Weather caused delays:

January	6	July	0
February	5	August	0
March	5	September	1
April	4	October	1
May	1	November	3
June	0	December	5

6. **Not Used.**

7. **Insurance Policy Limits**[A3]

All of Contractor's insurance shall be with insurance companies with an A.M. Best rating of no less than _____. The limits of insurance shall not be less than:

Commercial General Liability	Product Liability and Completed Operations, Fire Damage Liability – Split Limit	[E.G.] Low Risk: \$1,000,000 per occurrence; \$2,000,000 aggregate
		Intermediate Risk: \$2,000,000 per occurrence; \$4,000,000 aggregate
		High Risk: \$5,000,000 per occurrence; \$10,000,000 aggregate]
Automobile Liability – Any Auto	Combined Single Limit	[E.G.] Personal vehicles: \$500,000 Commercial vehicles: \$1,000,000
		Personal vehicles: \$100,000 per person/ \$300,000 per accident]
Workers' Compensation		Statutory limits pursuant to State law
Employers' Liability		[E.G. \$0]
Builder's Risk (Course of Construction)		Issued for the value and scope of Work indicated herein.
Pollution Liability		[E.G. \$0]

8. **Permits, Certificates, Licenses, Fees, Approvals**

8.1 Payment for Permits, Certificates, Licenses, Fees, and Approvals. As required in the General Conditions, the Contractor shall secure and pay for all permits, licenses, approvals, and certificates necessary for the prosecution of the Work with the exception of the following:

8.1.1 Marin Municipal Water District Fees to be paid by District. [A4]

With respect to the above-listed items, Contractor shall be responsible for securing such items; however, District will be responsible for payment of these charges or fees. Contractor shall notify the District of the amount due with respect to such items and to whom the amount is payable. Contractor shall provide the District with an invoice and receipt with respect to such charges or fees.

8.2 General Permit For Storm Water Discharges Associated With Construction and Land Disturbance Activities

8.2.1 Contractor acknowledges that all California school districts are obligated to develop and implement the following requirements for the discharge of storm water to surface waters from its construction and land disturbance activities (storm water requirements), without limitation:

8.2.1.1 Municipal Separate Storm Sewer System (MS4) is a system of conveyances used to collect and/or convey storm water, including, without limitation, catch basins, curbs, gutters, ditches, man-made channels, and storm drains.

8.2.1.2 Storm Water Pollution Prevention Plan ("SWPPP") contains specific best management practices ("BMPs") and establishes numeric effluent limitations at:

8.2.1.2.1 Sites where the District engages in maintenance (e.g., fueling, cleaning, repairing) for transportation activities.

8.2.1.2.2 Construction sites where:

8.2.1.2.2.1 One (1) or more acres of soil will be disturbed, or

8.2.1.2.2.2 The project is part of a larger common plan of development that disturbs more than one (1) acre of soil.

8.2.2 Contractor shall comply with any District storm water requirements that are approved by the District and applicable to the Project, at no additional cost to the District.

8.2.3 At no additional cost to the District, Contractor shall provide a Qualified Storm Water Practitioner who shall be onsite and implement and monitor any and all SWPPP requirements applicable to the Project, including but not limited to:

8.2.3.1 At least forty eight (48) hours prior to a forecasted rain event, implementing the Rain Event Action Plan (REAP) for any rain event requiring implementation of the REAP, including any erosion and sediment control measures needed to protect all exposed portions of the site; and

8.2.3.2 Monitoring any Numeric Action Levels (NALs), if applicable.

9. Not Used.

10. As-Builts and Record Drawings

10.1 When called for by Division 1, Contractor shall submit As-Built Drawings pursuant to the Contract Documents consisting of one set of computer-aided design and drafting ("CADD")[A5] files in the following format PDF, CADD, and BIM if used[A6], plus one set of As-Built Drawings on vellum or mylar[A7].

10.2 Contractor shall submit Record Drawings pursuant to the Contract Documents consisting of one set of computer-aided design and drafting ("CADD")[A8] files in the following format PDF, CADD, and BIM if used[A9], plus one set of Record Drawings on vellum or mylar[A10].

11. Fingerprinting

Contractor shall comply with the provisions of Education Code section 45125.2 regarding the submission of employee fingerprints to the California Department of Justice and the completion of criminal background investigations of its employees, its subcontractor(s), and its subcontractors' employees. Contractor shall not permit any employee to have any contact with District pupils until

such time as Contractor has verified in writing to the governing board of the District, that such employee has not been convicted of a violent or serious felony, as defined in Education Code section 45122.1. Contractor shall fully complete and perform all tasks required pursuant to the Criminal Background Investigation/ Fingerprinting Certification.

12. Not Used.

13. Construction Manager

The District will use a Construction Manager on the Project that is the subject of this Contract. (TBD) [A11] is the Construction Manager for this Project.

14. Program Manager

Van Pelt Construction Services [A12] is the Program Manager designated for the Project that is the subject of this Contract.

Van Pelt Construction Services
415-492-5904
310 Nova Albion Way
San Rafael, CA 94903

15. Federal Funds

As this Project is funded in whole or in part by federal funds, Contractor and all Subcontractors are subject to civil or criminal prosecution for any violation of the federal False Claims Act set forth under section 1001 of title 18 and section 231 of title 31 of the United States Code.

The following provisions are added as Section 27:

27. FEDERAL LABOR, WAGE & HOUR, APPRENTICE, AND RELATED PROVISIONS

27.1 Minimum Wages

The Davis-Bacon Act and 29 CFR parts 1 through 7 shall apply if the Project is financed in whole or in part from Federal funds or in accordance with guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution.

27.1.1 All laborers and mechanics employed or working upon the Site of the Work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the Project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account, except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3) , the full amount of wages and bona fide fringe benefits, or cash equivalents thereof, due at time of payment computed at rates not less than those contained in the applicable wage determination of the Secretary of Labor regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of this section, including but not limited to paragraph 27.1.7; also, regular contributions made or costs incurred for more than a weekly period, but not less often than quarterly, under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of Work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or

mechanics performing Work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which Work is performed. The wage determination including any additional classification and wage rates conformed under this section, including but not limited to paragraph 27.1.6 and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its Subcontractors at the Site of the Work in a prominent and accessible place where it can be easily seen by the workers.

27.1.2 Any class of laborers or mechanics, including helpers, and which is to be employed under the Contract which is not listed in the wage determination shall be classified in conformance with the wage determination. An additional classification and wage rate and fringe benefits will not be approved unless when the following criteria have been met:

27.1.2.1 The Work to be performed by the classification requested is not performed by a classification in the wage determination; and

27.1.2.2 The classification is utilized in the area by the construction industry; and

27.1.2.3 The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

27.1.3 If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the District agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the Contractor to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210.

27.1.4 In the event the Contractor, the laborers or mechanics to be employed in the classification or their representatives, and the District do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the Contractor shall provide the questions, including the views of all interested parties and the recommendation of the District, to the District for the District's review and referral to the Administrator for determination.

27.1.5 The wage rate (including fringe benefits where appropriate) determined pursuant to this section, shall be paid to all workers performing Work in the classification under this Contract from the first day on which Work is performed in the classification.

27.1.6 Whenever the minimum wage rate prescribed in any applicable wage determination for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, Contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

27.1.7 If the Contractor does not make payments to a trustee or other third person, the Contractor may consider, as part of the wages of any laborer or mechanic, the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. If the Secretary of Labor so requires, the Contractor shall set aside in a separate account sufficient assets to meet obligations under the plan or program.

27.2 Withholding. District may, upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor under this Contract or any other Federal contract with the same Contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same Contractor, so much of the accrued payments or advances as may

be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any Subcontractor the full amount of wages required by the Contract. In the event of Contractor's or any Subcontractors' failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the Site of the Work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the Contract, the District may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as it deems necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

27.3 Payrolls and basic records.

27.3.1 Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the Work and preserved for a period of three years thereafter for all laborers and mechanics working at the Site of the Work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records that show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

27.3.2 The Contractor shall submit weekly for each week in which any Contract Work is performed a copy of all payrolls to the District. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information shall be submitted on a form acceptable to the District. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <https://www.dol.gov/whd/programs/dbra/wh347.htm> or its successor site. Contractor is responsible for the submission of copies of payrolls by all Subcontractors. Contractor and Subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the District, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. Contractor may require a Subcontractor to provide addresses and social security numbers to the Contractor for its own records, without weekly submission to the District or other government agency

27.3.3 Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or Subcontractor or his or her agent who pays or supervises the payment of the persons employed under the Contract and shall certify the following:

27.3.3.1 That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5,

27.3.3.2 That the appropriate information is being maintained under 29 CFR 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and

27.3.3.3 That such information is correct and complete;

27.3.3.4 That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the Contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and

27.3.3.5 That no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

27.3.3.6 That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of Work performed, as specified in the applicable wage determination incorporated into or applicable to the Contract.

27.3.3.7 The weekly submission of a properly executed certification in the form set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 27.3.3 of this section.

27.3.3.8 The falsification of any of the above certifications may subject the Contractor or one or more Subcontractors to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

27.3.3.9 The Contractor or Subcontractor shall make the records required under this section available for inspection, copying, or transcription by authorized representatives of the District or the federal Department of Labor, and shall permit representatives to interview employees during working hours on the job. If the Contractor or Subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the Contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

27.4 Apprentices and trainees

27.4.1 Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the Work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first ninety (90) days of probationary employment as an apprentice in an eligible apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job Site in any craft classification shall not be greater than the ratio permitted to the Contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of Work actually performed. In addition, any apprentice performing Work on the job Site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the Work actually performed. Where a Contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage

rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or Subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the Work performed until an acceptable program is approved.

27.4.2 Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to Work at less than the predetermined rate for the Work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job Site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of Work actually performed. In addition, any trainee performing Work on the job Site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the Work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the Work performed until an acceptable program is approved.

27.4.3 Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

27.5 Compliance with Copeland Act requirements. Contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this Contract.

27.6 Subcontracts. The Contractor or Subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the Federal agency may by appropriate instructions require, and also a clause requiring the Subcontractors to include these clauses in any lower tier subcontracts. The Contractor shall be responsible for the compliance by any Subcontractor or lower tier Subcontractor with all the Contract clauses in 29 CFR 5.5.

27.7 Contract termination: debarment. A breach of the Contract clauses in 29 CFR 5.5 may be grounds for termination of the Contract, and for debarment as a Contractor and a Subcontractor as provided in 29 CFR 5.12.

27.8 Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this Contract.

27.9 Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this Contract shall not be subject to the general disputes clause of this Contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its Subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

27.10 Certification of eligibility.

27.10.1 By entering into this Contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

27.10.2 No part of this Contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

27.10.3 Contractor shall be subject to the penalty for making false statements prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

27.11 Clauses Mandated by Contract Work Hours and Safety Standards Act.

As used in the following paragraphs, the terms laborers and mechanics include watchmen and guards.

27.11.1 Overtime requirements. No Contractor or Subcontractor contracting for any part of the Contract Work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such Work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

27.11.2 Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in the foregoing paragraph the Contractor and any Subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and Subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the foregoing paragraph, in the sum of \$10 for each calendar day on which such individual was required or permitted to Work in excess of the standard workweek of forty hours without payment of the overtime wages required by the foregoing paragraph.

27.11.3 Withholding for unpaid wages and liquidated damages. The District may upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of Work performed by the Contractor or Subcontractor under the Contract or any other Federal contract with the same Contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or Subcontractor for unpaid wages and liquidated damages as provided in the foregoing paragraph.

27.11.4 Subcontracts. The Contractor or Subcontractor shall insert in any subcontracts the foregoing paragraphs concerning "Overtime requirements" and "Violation;

liability for unpaid wages; liquidated damages" and also a clause requiring each Subcontractor to include these clauses in any lower tier subcontracts. Contractor shall be responsible for compliance by any Subcontractor or lower tier Subcontractor with the clauses set forth in paragraphs 27.11.1 through 27.11.4 of this section.

15. Preliminary Schedule of Values

The preliminary schedule of values shall include, at a minimum, the following information and the following structure:

Replace provision in the General Conditions with the following provisions:

15.1.1.2.3. The preliminary schedule of values shall not provide for values any greater than the following percentages of the Contract value:

15.1.2.3.1 Mobilization and layout combined to equal not more than **[1]**%;

15.1.1.2.3.2 Submittals, samples and shop drawings combined to equal not more than **[3]**%;

15.1.1.2.3.3 Bonds and insurance combined to equal not more than **[2]**%[A13].

END OF DOCUMENT

06/06/18

**HAZARDOUS MATERIALS
PROCEDURES & REQUIREMENTS**

1. SUMMARY

This document includes information applicable to hazardous materials and hazardous waste abatement.

2. NOTICE OF HAZARDOUS WASTE OR MATERIALS

- a. Contractor shall give notice in writing to the District, the Construction Manager, and the Architect promptly, before any of the following materials are disturbed, and in no event later than twenty-four (24) hours after first observance, of any:
 - (1) Material that Contractor believes may be a material that is hazardous waste or hazardous material, as defined in section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law;
 - (2) Other material that may present a substantial danger to persons or property exposed thereto in connection with Work at the site.
- b. Contractor's written notice shall indicate whether the hazardous waste or material was shown or indicated in the Contract Documents to be within the scope of Work, and whether the materials were brought to the site by Contractor, its Subcontractors, suppliers, or anyone else for whom Contractor is responsible. As used in this section the term "hazardous materials" shall include, without limitation, asbestos, lead, Polychlorinated biphenyl (PCB), petroleum and related hydrocarbons, and radioactive material.
- c. In response to Contractor's written notice, the District shall investigate the identified conditions.
- d. If the District determines that conditions do not involve hazardous materials or that no change in terms of Contract is justified, the District shall so notify Contractor in writing, stating reasons. If the District and Contractor cannot agree on whether conditions justify an adjustment in Contract Price or Contract Time, or on the extent of any adjustment, Contractor shall proceed with the Work as directed by the District.
- e. If after receipt of notice from the District, Contractor does not agree to resume Work based on a reasonable belief it is unsafe, or does not agree to resume Work under special conditions, then District may order such portion of Work that is in connection with such hazardous condition or such affected area to be deleted from the Work, or performed by others, or District may invoke its rights to terminate the Contract in whole or in part. District will determine entitlement to or the amount or extent of an adjustment, if any, in Contract Price or Contract Time as a result of deleting such portion of Work, or performing the Work by others.
- f. If Contractor stops Work in connection with any hazardous condition and in any area affected thereby, Contractor shall immediately redeploy its workers, equipment, and materials, as necessary, to other portions of the Work to minimize delay and disruption.

3. ADDITIONAL WARRANTIES AND REPRESENTATIONS

- a. Contractor represents and warrants that it, its employees, and its subcontractors and their employees, shall at all times have the required levels of familiarity with the Site and the Work, training, and ability to comply fully with all applicable laws and contractual requirements for safe and expeditious performance of the Work, including whatever training is or may be required regarding the activities to be performed (including, but not limited to, all training required to address adequately the actual or potential dangers of Contract performance).
- b. Contractor represents and warrants that it, its employees, and its subcontractors and their employees, shall at all times have and maintain in good standing any and all certifications and licenses required by applicable federal, state, and other governmental and quasi-governmental requirements applicable to the Work.
- c. Contractor represents and warrants that it has studied carefully all requirements of the Specifications regarding procedures for demolition, hazardous waste abatement, or safety practices, specified in the Contract, and prior to submitting its bid, has either (a) verified to its satisfaction that the specified procedures are adequate and sufficient to achieve the results intended by the Contract Documents, or (b) by way of approved "or equal" request or request for clarification and written Addenda, secured changes to the specified procedures sufficient to achieve the results intended by the Contract Documents. Contractor accepts the risk that any specified procedure will result in a completed Project in full compliance with the Contract Documents.

4. MONITORING AND TESTING

- a. District reserves the right, in its sole discretion, to conduct air monitoring, earth monitoring, Work monitoring, and any other tests (in addition to testing required under the agreement or applicable law), to monitor Contract requirements of safe and statutorily compliant work methods and (where applicable) safe re-entry level air standards under state and federal law upon completion of the job, and compliance of the work with periodic and final inspection by public and quasi-public entities having jurisdiction.
- b. Contractor acknowledges that District has the right to perform, or cause to be performed, various activities and tests including, but not limited to, pre-abatement, during abatement, and post-abatement air monitoring, that District shall have no obligation to perform said activities and tests, and that a portion of said activities and tests may take place prior to the completion of the Work by Contractor. In the event District elects to perform these activities and tests, Contractor shall afford District ample access to the Site and all areas of the Work as may be necessary for the performance of these activities and tests. Contractor will include the potential impact of these activities or tests by District in the Contract Price and the Scheduled Completion Date.
- c. Notwithstanding District's rights granted by this paragraph, Contractor may retain its own industrial hygiene consultant at Contractor's own expense and may collect samples and may perform tests including, but not limited to, pre-abatement, during abatement, and post-abatement personal air monitoring, and District reserves the right to request documentation of all such activities and tests performed by Contractor relating to the Work and Contractor shall immediately provide that documentation upon request.

5. COMPLIANCE WITH LAWS

- a. Contractor shall perform safe, expeditious, and orderly work in accordance with the best practices and the highest standards in the hazardous waste abatement, removal, and disposal industry, the applicable law, and the Contract Documents,

including, but not limited to, all responsibilities relating to the preparation and return of waste shipment records, all requirements of the law, delivering of all requisite notices, and obtaining all necessary governmental and quasi-governmental approvals.

- b. Contractor represents that it is familiar with and shall comply with all laws applicable to the Work or completed Work including, but not limited to, all federal, state, and local laws, statutes, standards, rules, regulations, and ordinances applicable to the Work relating to:
 - (1) The protection of the public health, welfare and environment;
 - (2) Storage, handling, or use of asbestos, PCB, lead, petroleum based products, radioactive material, or other hazardous materials;
 - (3) The generation, processing, treatment, storage, transport, disposal, destruction, or other management of asbestos, PCB, lead, petroleum, radioactive material, or hazardous waste materials or other waste materials of any kind; and
 - (4) The protection of environmentally sensitive areas such as wetlands and coastal areas.

6. DISPOSAL

- a. Contractor has the sole responsibility for determining current waste storage, handling, transportation, and disposal regulations for the job Site and for each waste disposal facility. Contractor must comply fully at its sole cost and expense with these regulations and any applicable law. District may, but is not obligated to, require submittals with this information for it to review consistent with the Contract Documents.
- b. Contractor shall develop and implement a system acceptable to District to track hazardous waste from the Site to disposal, including appropriate "Hazardous Waste Manifests" on the EPA form, so that District may track the volume of waste it put in each landfill and receive from each landfill a certificate of receipt.
- c. Contractor shall provide District with the name and address of each waste disposal facility prior to any disposal, and District shall have the express right to reject any proposed disposal facility. Contractor shall not use any disposal facility to which District has objected. Contractor shall document actual disposal or destruction of waste at a designated facility by completing a disposal certificate or certificate of destruction forwarding the original to the District.

7. PERMITS

- a. Before performing any of the Work, and at such other times as may be required by applicable law, Contractor shall deliver all requisite notices and obtain the approval of all governmental and quasi-governmental authorities having jurisdiction over the Work. Contractor shall submit evidence satisfactory to District that it and any disposal facility
 - (1) have obtained all required permits, approvals, and the like in a timely manner both prior to commencement of the Work and thereafter as and when required by applicable law, and
 - (2) are in compliance with all such permits, approvals and the regulations.

For example, before commencing any work in connection with the Work involving asbestos-containing materials, or PCBs, or other hazardous materials subject to regulation, Contractor agrees to provide the required notice of intent to renovate or demolish to the appropriate state or federal agency having jurisdiction, by certified mail, return receipt requested, or by some other method of transmittal for which a return receipt is obtained, and to send a copy of that notice to District. Contractor shall not conduct any Work involving asbestos-containing materials or PCBs unless Contractor has first confirmed that the appropriate agency having jurisdiction is in receipt of the required notification. All permits, licenses, and bonds that are required by governmental or quasi-governmental authorities, and all fees, deposits, tap fees, offsite easements, and asbestos and PCB disposal facilities expenses necessary for the prosecution of the Work, shall be procured and paid for by Contractor. Contractor shall give all notices and comply with the all applicable laws bearing on the conduct of the Work as drawn and specified. If Contractor observes or reasonably should have observed that Plans and Specifications and other Contract Documents are at variance therewith, it shall be responsible for promptly notifying District in writing of such fact. If Contractor performs any Work contrary to applicable laws, it shall bear all costs arising therefrom.

- b. In the case of any permits or notices held in District's name or of necessity to be made in District's name, District shall cooperate with Contractor in securing the permit or giving the notice, but the Contractor shall prepare for District review and execution upon approval, all necessary applications, notices, and other materials.

8. INDEMNIFICATION

To the extent permitted by law, the indemnities and limitations of liability expressed throughout the Contract Documents apply with equal force and effect to any claims or liabilities imposed or existing by virtue of the removal, abatement, and disposal of hazardous waste. This includes, but is not limited to, liabilities connected to the selection and use of a waste disposal facility, a waste transporter, personal injury, property damage, loss of use of property, damage to the environment or natural resources, or "disposal" and "release" of materials associated with the Work (as defined in 42 U.S.C. § 9601 *et seq.*).

9. TERMINATION

District shall have an absolute right to terminate for default immediately without notice and without an opportunity to cure should Contractor knowingly or recklessly commit a material breach of the terms of the Contract Documents, or any applicable law, on any matter involving the exposure of persons or property to hazardous waste. However, if the breach of contract exposing persons or property to hazardous waste is due solely to an ordinary, unintentional, and non-reckless failure to exercise reasonable care, then the procedures for termination for cause shall apply without modification.

END OF DOCUMENT

06/06/18

SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Site Access Conditions and Requirements;
- B. Special Conditions.

1.02 SUMMARY OF WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of this Contract consists of the following: Renovation of existing Library space into classrooms; reconfiguration of exterior walls; addition of doors and windows at the interior and exterior; modification of fire alarm and fire sprinkler systems required for reconfigured space.

1.03 CONTRACTS

- A. Perform the Work under a single, fixed-price Contract.

1.04 WORK BY OTHERS

- A. Work on the Project that will be performed and completed prior to the start of the Work of this Contract:
 - (1) Asbestos removal/abatement.
 - (2) Lead paint removal/abatement.
- B. Work on the Project that will be performed by others concurrent with the Work of this Contract:

[FILL IN OR MODIFY AS APPROPRIATE]

- (1) _____
- (2) _____

1.05 OWNER-FURNISHED PRODUCTS

- A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products **and making building services connections.**
- B. Owner-Furnished Contractor-Installed Products:
 - 1. Short-throw Projectors.

1.05 CODES, REGULATIONS, AND STANDARDS

- A. The codes, regulations, and standards adopted by the state and federal agencies having jurisdiction shall govern minimum requirements for this project. Where codes, regulations, and standards conflict with the Contract Documents, these conflicts shall be brought to the immediate attention of the District and the Architect.
- B. Codes, regulations, and standards shall be as published effective as of date of bid opening, unless otherwise specified or indicated.

1.06 PROJECT RECORD DOCUMENTS

- A. Contractor shall maintain on Site one set of the following record documents; Contractor shall record actual revisions to the Work:
 - (1) Contract Drawings.
 - (2) Specifications.
 - (3) Addenda.
 - (4) Change Orders and other modifications to the Contract.
 - (5) Reviewed shop drawings, product data, and samples.
 - (6) Field test records.
 - (7) Inspection certificates.
 - (8) Manufacturer's certificates.
- B. Contractor shall store Record Documents separate from documents used for construction. Provide files, racks, and secure storage for Record Documents and samples.
- C. Contractor shall record information concurrent with construction progress.
- D. Specifications: Contractor shall legibly mark and record at each product section of the Specifications the description of the actual product(s) installed, including the following:
 - (1) Manufacturer's name and product model and number.
 - (2) Product substitutions or alternates utilized.
 - (3) Changes made by Addenda and Change Orders and written directives.

1.07 EXAMINATION OF EXISTING CONDITIONS

- A. Contractor shall be held to have examined the Project Site and acquainted itself with the conditions of the Site or of the streets or roads approaching the Site.
- B. Prior to commencement of Work, Contractor shall survey the Site and existing buildings and improvements to observe existing damage and defects such as cracks, sags, broken, missing or damaged glazing, other building elements and Site improvements, and other damage.

- C. Should Contractor observe cracks, sags, and other damage to and defects of the Site and adjacent buildings, paving, and other items not indicated in the Contract Documents, Contractor shall immediately report same to the District and the Architect.

1.08 CONTRACTOR'S USE OF PREMISES

- A. If unoccupied and only with District's prior written approval, Contractor may use the building(s) at the Project Site without limitation for its operations, storage, and office facilities for the performance of the Work. If the District chooses to beneficially occupy any building(s), Contractor must obtain the District's written approval for Contractor's use of spaces and types of operations to be performed within the building(s) while so occupied. Contractor's access to the building(s) shall be limited to the areas indicated.
- B. If the space at the Project Site is not sufficient for Contractor's operations, storage, office facilities and/or parking, Contractor shall arrange and pay for any additional facilities needed by Contractor.
- C. Contractor shall not interfere with use of or access to occupied portions of the building(s) or adjacent property.
- D. Contractor shall maintain corridors, stairs, halls, and other exit-ways of building clear and free of debris and obstructions at all times.
- E. No one other than those directly involved in the demolition and construction, or specifically designated by the District or the Architect shall be permitted in the areas of work during demolition and construction activities.
- F. The Contractor shall install the construction fence and maintain that it will be locked when not in use. Keys to this fencing will be provided to the District.

1.09 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. The Drawings show above-grade and below-grade structures, utility lines, and other installations that are known or believed to exist in the area of the Work. Contractor shall locate these existing installations before proceeding with excavation and other operations that could damage same; maintain them in service, where appropriate; and repair damage to them caused by the performance of the Work. Should damage occur to these existing installations, the costs of repair shall be at the Contractor's expense and made to the District's satisfaction.
- B. Contractor shall be alert to the possibility of the existence of additional structures and utilities. If Contractor encounters additional structures and utilities, Contractor will immediately report to the District for disposition of same as indicated in the General Conditions.

1.10 UTILITY SHUTDOWNS AND INTERRUPTIONS

- A. Contractor shall give the District a minimum of three (3) days written notice in advance of any need to shut off existing utility services or to effect equipment interruptions. The District will set exact time and duration for shutdown, and will assist Contractor with shutdown. Work required to re-establish utility services shall be performed by the Contractor.
- B. Contractor shall obtain District's written approval as indicated in the General Conditions in advance of deliveries of material or equipment or other activities that may conflict with District's use of the building(s) or adjacent facilities.

1.11 STRUCTURAL INTEGRITY

- A. Contractor shall be responsible for and supervise each operation and work that could affect structural integrity of various building elements, both permanent and temporary.
- B. Contractor shall include structural connections and fastenings as indicated or required for complete performance of the Work.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF SECTION

06/06/18

SECTION 01 21 00

ALLOWANCE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
 - 1. Contingency allowances for unforeseen conditions.

1.2 RELATED SECTIONS

- A. Document 00 63 40 – Allowance Expenditure Directive Form.
- B. Section 01 10 00 - Summary of Work.
- C. Section 01 29 00 - Application for Payment and Conditional and Unconditional Waiver and Release Forms.
- D. Section 01 33 00 – Submittals.

1.3 DEFINITIONS

- A. Allowance is a quantity of work or dollar amount established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

1.4 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 CONTINGENCY ALLOWANCES

- A. Included in the Contract, a stipulated sum/price equal to 10% of the Bidders Base Bid and each Alternate, as an allowance for Unforeseen Conditions within the limits set forth in the Contract Documents. This Allowance shall not be utilized without written approval by the District.
- B. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding and equipment rental will be included in Allowance Expenditure Directive authorizing expenditure of funds from this Allowance.
- C. Funds will be drawn from Allowance only with District approval evidenced by an Allowance Expenditure Directive.
- D. At Contract closeout, funds remaining in Allowance will be credited to District by Change Order.

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

END OF SECTION

06/06/18

SECTION 01 22 00

ALTERNATES AND UNIT PRICING

PART 1 – ALTERNATES

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions;
- C. Bid Form and Proposal;
- D. Instruction to Bidders.

1.02 SUMMARY

- A. Section includes administrative and procedural requirements for alternates and unit pricing.

1.03 DESCRIPTION

- A. The items of work indicated below propose modifications to, substitutions for, additions to and/or deletions from the various parts of the Work specified in other Sections of the Specifications. The acceptance or rejection of any of the alternates is strictly at the option of the District subject to District's acceptance of Contractor's stated prices contained in this Proposal.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.04 GENERAL

- A. Where an item is omitted, or scope of Work is decreased, all Work pertaining to the item whether specifically stated or not, shall be omitted and where an item is added or modified or where scope of Work is increased, all Work pertaining to that required to render same ready for use on the Project in accordance with intention of Drawings and Specifications shall be included in an agreed upon price amount.

1.05 BASE BID

- A. The Base Bid includes all work required to construct the Project completely and in accordance with the Contract Documents.

1.06 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other work of the Contract.
- C. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

1.07 ALTERNATE NO. 1 – _____

- A. Provide _____.
 1. As indicated on drawings _____; and as specified in Section _____
- B. Base Bid shall not include _____, but shall include _____.

1.08 ALTERNATE NO. 2 – _____

- A. Provide _____.
 1. As indicated on drawings _____; and as specified in Section _____
- B. Base Bid shall not include _____, but shall include _____.

The above Alternate descriptions are general in nature and for reference purposes only. The Contract Documents, including, without limitation, the Drawings and Specifications, must be referred to for the complete scope of Work.

PART 2 - UNIT PRICING

2.01 GENERAL

- A. Contractor shall completely state all required figures based on Unit Prices listed below. Where scope of Work is decreased, all Work pertaining to the item, whether specifically stated or not, shall be omitted and where scope of Work is increased, all work pertaining to that item required to render same ready for use on the Project in accordance with intention of Drawings and Specifications shall be included in an agreed upon price amount.

2.02 UNIT PRICES

- A. Not Used.

END OF DOCUMENT

06/06/18

SECTION 01 25 13

PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. Instructions to Bidders;
- B. General Conditions, including, without limitation, Substitutions For Specified Items; and
- C. Special Conditions.

1.02 SUBSTITUTIONS OF MATERIALS AND EQUIPMENT

- A. Catalog numbers and specific brands or trade names followed by the designation "or equal" are used in conjunction with material and equipment required by the Specifications to establish the standards of quality, utility, and appearance required. Substitutions which are equal in quality, utility, and appearance to those specified may be reviewed subject to the provisions of the General Conditions.
- B. Wherever more than one manufacturer's product is specified, the first-named product is the basis for the design used in the work and the use of alternative-named manufacturers' products or substitutes may require modifications in that design. If such alternatives are proposed by Contractor and are approved by the District and/or the Architect, Contractor shall assume all costs required to make necessary revisions and modifications of the design resulting from the substitutions requested by the Contractor.
- C. When materials and equipment are specified by first manufacturer's name and product number, second manufacturer's name and "or approved equal," supporting data for the second product, if proposed by Contractor, shall be submitted in accordance with the requirements for substitutions. The District's Board has found and determined that certain item(s) shall be used on this Project based on the purpose(s) indicated pursuant to Public Contract Code section 3400(c). These findings, as well as the products and brand or trade names, have been identified in the Notice to Bidders.
- D. The Contractor will not be allowed to substitute specified items unless the request for substitution is submitted as follows:
 - (1) District must receive any notice of request for substitution of a specified item a minimum of ten (10) calendar days prior to bid opening.
 - (2) Within 35 days after the date of the Notice of Award, the Contractor shall submit data substantiating the request(s) for all substitution(s) containing sufficient information to assess acceptability of product or system and impact on Project, including, without limitation, the requirements specified in the Special Conditions and the technical Specifications. Insufficient information shall be grounds for rejection of substitution.
- E. If the District and/or Architect, in reviewing proposed substitute materials and equipment, require revisions or corrections to be made to previously accepted Shop Drawings and supplemental supporting data to be resubmitted, Contractor shall

promptly do so. If any proposed substitution is judged by the District and/or Architect to be unacceptable, the specified material or equipment shall be provided.

- F. Samples may be required. Tests required by the District and/or Architect for the determination of quality and utility shall be made at the expense of Contractor, with acceptance of the test procedure first given by the District.
- G. In reviewing the supporting data submitted for substitutions, the District and/or Architect will use for purposes of comparison all the characteristics of the specified material or equipment as they appear in the manufacturer's published data even though all the characteristics may not have been particularly mentioned in the Contract Documents. If more than two (2) submissions of supporting data are required, the cost of reviewing the additional supporting data shall be borne by Contractor, and the District will deduct the costs from the Contract Price. The Contractor shall be responsible for any re-design costs occasioned by District's acceptance and/or approval of any substitute.
- H. The Contractor shall, in the event that a substitute is less costly than that specified, credit the District with one hundred percent (100%) of the net difference between the substitute and the originally specified material. In this event, the Contractor agrees to execute a deductive Change Order to reflect that credit. In the event Contractor furnishes a material, process, or article more expensive than that specified, the difference in the cost of that material, process, or article so furnished shall be borne by Contractor.
- I. In no event shall the District be liable for any increase in Contract Price or Contract Time due to any claimed delay in the evaluation of any proposed substitute or in the acceptance or rejection of any proposed substitute.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF SECTION

06/06/18

SECTION 01 26 00

CHANGES IN THE WORK

CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE PROVISIONS IN THE AGREEMENT, GENERAL CONDITIONS, AND SPECIAL CONDITIONS, IF USED, RELATED TO CHANGES AND/OR REQUESTS FOR CHANGES.

END OF SECTION

06/06/18

SECTION 01 29 00

**APPLICATION FOR PAYMENT AND
CONDITIONAL AND UNCONDITIONAL WAIVER AND RELEASE FORMS**

**CONTRACTOR SHALL COMPLY WITH ALL PROVISIONS IN THE GENERAL CONDITIONS
RELATED TO APPLICATIONS FOR PAYMENT AND/OR PAYMENTS.**

END OF SECTION

06/06/18

**CONDITIONAL WAIVER AND RELEASE
ON PROGRESS PAYMENT
(CIVIL CODE SECTION 8132)**

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Through Date: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: _____

Amount of Check: \$ _____

Check Payable to: _____

Exceptions

This document does not affect any of the following:

- (1) Retentions.
- (2) Extras for which the claimant has not received payment.
- (3) The following progress payments for which the claimant has previously given a conditional waiver and release but has not received payment:

Date(s) of waiver and release: _____

Amount(s) of unpaid progress payment(s): \$ _____

- (4) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

**UNCONDITIONAL WAIVER AND RELEASE
ON PROGRESS PAYMENT
(CIVIL CODE SECTION 8134)**

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Through Date: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has received the following progress payment: \$_____

Exceptions

This document does not affect any of the following:

- (1) Retentions.
- (2) Extras for which the claimant has not received payment.
- (3) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

**CONDITIONAL WAIVER AND RELEASE
ON FINAL PAYMENT
(CIVIL CODE SECTION 8136)**

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: _____

Amount of Check: \$ _____

Check Payable to: _____

Exceptions

This document does not affect any of the following: _____

Disputed claims for extras in the amount of: \$ _____

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

**UNCONDITIONAL WAIVER AND RELEASE
ON FINAL PAYMENT
(CIVIL CODE SECTION 8138)**

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for all labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has been paid in full.

Exceptions

This document does not affect any of the following: _____

Disputed claims for extras in the amount of: \$ _____

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

SECTION 01 31 19

PROJECT MEETINGS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions; and
- B. Special Conditions.

1.02 PROGRESS MEETINGS

- A. Contractor shall schedule and hold regular weekly progress meetings after a minimum of one week's prior written notice of the meeting date and time to all Invitees as indicated below.
- B. Location: Contractor's field office.
- C. The Contractor shall notify and invite the following entities ("Invitees"):
 - (1) District Representative.
 - (2) Contractor.
 - (3) Contractor's Project Manager.
 - (4) Contractor's Superintendent.
 - (5) Subcontractors, as appropriate to the agenda of the meeting.
 - (6) Suppliers, as appropriate to the agenda of the meeting.
 - (7) Construction Manager, if any.
 - (8) Architect.
 - (9) Engineer(s), if any and as appropriate to the agenda of the meeting.
 - (10) Others, as appropriate to the agenda of the meeting.
- D. The District's, the Architect's, and/or an engineer's Consultants will attend at their discretion, in response to the agenda.
- E. The District representative, the Construction Manager, and/or another District Agent shall take and distribute meeting notes to attendees and other concerned parties. If exceptions are taken to anything in the meeting notes, those exceptions shall be stated in writing to the District within five (5) working days following District's distribution of the meeting notes.

1.03 PRE-INSTALLATION/PERFORMANCE MEETING

- A. Contractor shall schedule a meeting prior to the start of each of the following portions of the Work: cutting and patching of plaster and roofing, and other weather-exposed and moisture-resistant products. Contractor shall invite all Invitees to this meeting, and others whose work may affect or be affected by the quality of the cutting and patching work.
- B. Contractor shall review in detail prior to this meeting, the manufacturer's requirements and specifications, applicable portions of the Contract Documents, Shop Drawings, and other submittals, and other related work. At this meeting, invitees shall review and resolve conflicts, incompatibilities, or inadequacies discovered or anticipated.
- C. Contractor shall review in detail Project conditions, schedule, requirements for performance, application, installation, and quality of completed Work, and protection of adjacent Work and property.
- D. Contractor shall review in detail means of protecting the completed Work during the remainder of the construction period.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF SECTION

06/06/18

SECTION 01 32 13

SCHEDULING OF WORK

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions;
- C. Summary of Work; and
- D. Submittals.

1.02 SECTION INCLUDES

- A. Scheduling of Work under this Contract shall be performed by Contractor in accordance with requirements of this Section.
 - (1) Development of schedule, cost and resource loading of the schedule, monthly payment requests, and project status reporting requirements of the Contract shall employ computerized Critical Path Method ("CPM") scheduling ("CPM Schedule").
 - (2) CPM Schedule shall be cost loaded based on Schedule of Values as approved by District.
 - (3) Submit schedules and reports as specified in the General Conditions.
- B. Upon Award of Contract, Contractor shall immediately commence development of Initial and Original CPM Schedules to ensure compliance with CPM Schedule submittal requirements.

1.03 CONSTRUCTION SCHEDULE

- A. Within ten (10) days of being awarded the Contract and before request for first progress payment, the Contractor shall prepare and submit to the Project Manager a construction progress schedule conforming to the Milestone Schedule below.
- B. The Construction Schedule shall be continuously updated, and an updated schedule shall be submitted with each application for progress payment. Each revised schedule shall indicate the work actually accomplished during the previous period and the schedule for completion of the remaining work.
- C. Milestone Schedule:

ACTIVITY DESCRIPTION

REQUIRED COMPLETION

[FILL IN ACTIVITIES AND DATES]
CONSTRUCTION STARTS
FINAL PROJECT COMPLETION

Date TBD
Date TBD

1.04 QUALIFICATIONS

- A. Contractor shall employ experienced scheduling personnel qualified to use the latest version of [i.e., Primavera Project Planner]. Experience level required is set forth below. Contractor may employ such personnel directly or may employ a consultant for this purpose.
- (1) The written statement shall identify the individual who will perform CPM scheduling.
 - (2) Capability and experience shall be verified by description of construction projects on which individual has successfully applied computerized CPM.
 - (3) Required level of experience shall include at least two (2) projects of similar nature and scope with value not less than three fourths ($\frac{3}{4}$) of the Total Bid Price of this Project. The written statement shall provide contact persons for referenced projects with current telephone and address information.
- B. District reserves the right to approve or reject Contractor's scheduler or consultant at any time. District reserves the right to refuse replacing of Contractor's scheduler or consultant, if District believes replacement will negatively affect the scheduling of Work under this Contract.

1.05 GENERAL

- A. Progress Schedule shall be based on and incorporate milestone and completion dates specified in Contract Documents.
- B. Overall time of completion and time of completion for each milestone shown on Progress Schedule shall adhere to times in the Contract, unless an earlier (advanced) time of completion is requested by Contractor and agreed to by District. Any such agreement shall be formalized by a Change Order.
- (1) District is not required to accept an early completion schedule, i.e., one that shows an earlier completion date than the Contract Time.
 - (2) Contractor shall not be entitled to extra compensation in event agreement is reached on an earlier completion schedule and Contractor completes its Work, for whatever reason, beyond completion date shown in its early completion schedule but within the Contract Time.
 - (3) A schedule showing the work completed in less than the Contract Time, and that has been accepted by District, shall be considered to have Project Float. The Project Float is the time between the scheduled completion of the work and the Completion Date. Project Float is a resource available to both District and the Contractor.
- C. Ownership Project Float: Neither the District nor Contractor owns Project Float. The Project owns the Project Float. As such, liability for delay of the Completion Date rests with the party whose actions, last in time, actually cause delay to the Completion Date.
- (1) For example, if Party A uses some, but not all of the Project Float and Party B later uses remainder of the Project Float as well as additional time beyond the Project Float, Party B shall be liable for the time that represents a delay to the Completion Date.

- (2) Party A would not be responsible for the time since it did not consume the entire Project Float and additional Project Float remained; therefore, the Completion Date was unaffected by Party A.
- D. Progress Schedule shall be the basis for evaluating job progress, payment requests, and time extension requests. Responsibility for developing Contract CPM Schedule and monitoring actual progress as compared to Progress Schedule rests with Contractor.
- E. Failure of Progress Schedule to include any element of the Work, or any inaccuracy in Progress Schedule, will not relieve Contractor from responsibility for accomplishing the Work in accordance with the Contract. District's acceptance of schedule shall be for its use in monitoring and evaluating job progress, payment requests, and time extension requests and shall not, in any manner, impose a duty of care upon District, or act to relieve Contractor of its responsibility for means and methods of construction.
- F. Software: Use Microsoft Project or Primavera, latest version. Such software shall be compatible with Windows operating system. Contractor shall transmit contract file to District on compact disk at times requested by District.
- G. Transmit each item under the form approved by District.
 - (1) Identify Project with District Contract number and name of Contractor.
 - (2) Provide space for Contractor's approval stamp and District's review stamps.
 - (3) Submittals received from sources other than Contractor will be returned to the Contractor without District's review.

1.06 INITIAL CPM SCHEDULE

- A. Initial CPM Schedule submitted for review at the pre-construction conference shall serve as Contractor's schedule for up to ninety (90) calendar days after the Notice to Proceed.
- B. Indicate detailed plan for the Work to be completed in first ninety (90) days of the Contract; details of planned mobilization of plant and equipment; sequence of early operations; procurement of materials and equipment. Show Work beyond ninety (90) calendar days in summary form.
- C. Initial CPM Schedule shall be time scaled.
- D. Initial CPM Schedule shall be cost and resource loaded. Accepted cost and resource loaded schedule will be used as basis for monthly progress payments until acceptance of the Original CPM Schedule. Use of Initial CPM Schedule for progress payments shall not exceed ninety (90) calendar days.
- E. District and Contractor shall meet to review and discuss the Initial CPM Schedule within seven (7) calendar days after it has been submitted to District.
 - (1) District's review and comment on the schedule shall be limited to Contract conformance (with sequencing, coordination, and milestone requirements).
 - (2) Contractor shall make corrections to schedule necessary to comply with Contract requirements and shall adjust schedule to incorporate any missing information requested by District. Contractor shall resubmit Initial CPM Schedule if requested by District.

- F. If, during the first ninety (90) days after Notice to Proceed, the Contractor is of the opinion that any of the Work included on its Initial CPM Schedule has been impacted, the Contractor shall submit to District a written Time Impact Evaluation ("TIE") in accordance with Article 1.12 of this Section. The TIE shall be based on the most current update of the Initial CPM Schedule.

1.07 ORIGINAL CPM SCHEDULE

- A. Submit a detailed proposed Original CPM Schedule presenting an orderly and realistic plan for completion of the Work in conformance with requirements as specified herein.
- B. Progress Schedule shall include or comply with following requirements:
- (1) Time scaled, cost and resource (labor and major equipment) loaded CPM schedule.
 - (2) No activity on schedule shall have duration longer than fifteen (15) work days, with exception of submittal, approval, fabrication and procurement activities, unless otherwise approved by District.
 - (a) Activity durations shall be total number of actual work days required to perform that activity.
 - (3) The start and completion dates of all items of Work, their major components, and milestone completion dates, if any.
 - (4) District furnished materials and equipment, if any, identified as separate activities.
 - (5) Activities for maintaining Project Record Documents.
 - (6) Dependencies (or relationships) between activities.
 - (7) Processing/approval of submittals and shop drawings for all material and equipment required per the Contract. Activities that are dependent on submittal acceptance or material delivery shall not be scheduled to start earlier than expected acceptance or delivery dates.
 - (a) Include time for submittals, re-submittals and reviews by District. Coordinate with accepted schedule for submission of Shop Drawings, samples, and other submittals.
 - (b) Contractor shall be responsible for all impacts resulting from re-submittal of Shop Drawings and submittals.
 - (8) Procurement of major equipment, through receipt and inspection at jobsite, identified as separate activity.
 - (a) Include time for fabrication and delivery of manufactured products for the Work.
 - (b) Show dependencies between procurement and construction.
 - (9) Activity description; what Work is to be accomplished and where.
 - (10) The total cost of performing each activity shall be total of labor, material, and equipment, excluding overhead and profit of Contractor. Overhead and profit

of the General Contractor shall be shown as a separate activity in the schedule. Sum of cost for all activities shall equal total Contract value.

- (11) Resources required (labor and major equipment) to perform each activity.
- (12) Responsibility code for each activity corresponding to Contractor or Subcontractor responsible for performing the Work.
- (13) Identify the activities which constitute the controlling operations or critical path. No more than twenty-five (25%) of the activities shall be critical or near critical. Near critical is defined as float in the range of one (1) to (10) days.
- (14) Twenty (20) workdays for developing punch list(s), completion of punch-list items, and final cleanup for the Work or any designated portion thereof. No other activities shall be scheduled during this period.
- (15) Interface with the work of other contractors, District, and agencies such as, but not limited to, utility companies.
- (16) Show detailed Subcontractor Work activities. In addition, furnish copies of Subcontractor schedules upon which CPM was built.
 - (a) Also furnish for each Subcontractor, as determined by District, submitted on Subcontractor letterhead, a statement certifying that Subcontractor concurs with Contractor's Original CPM Schedule and that Subcontractor's related schedules have been incorporated, including activity duration, cost and resource loading.
 - (b) Subcontractor schedules shall be independently derived and not a copy of Contractor's schedule.
 - (c) In addition to Contractor's schedule and resource loading, obtain from electrical, mechanical, and plumbing Subcontractors, and other Subcontractors as required by District, productivity calculations common to their trades, such as units per person day, feet of pipe per day per person, feet of wiring per day per person, and similar information.
 - (d) Furnish schedule for Contractor/Subcontractor CPM schedule meetings which shall be held prior to submission of Original CPM schedule to District. District shall be permitted to attend scheduled meetings as an observer.
- (17) Activity durations shall be in Work days.
- (18) Submit with the schedule a list of anticipated non Work days, such as weekends and holidays. The Progress Schedule shall exclude in its Work day calendar all non Work days on which Contractor anticipates critical Work will not be performed.

C. Original CPM Schedule Review Meeting: Contractor shall, within sixty (60) days from the Notice to Proceed date, meet with District to review the Original CPM Schedule submittal.

- (1) Contractor shall have its Project Manager, Project Superintendent, Project Scheduler, and key Subcontractor representatives, as required by District, in attendance. The meeting will take place over a continuous one (1) day period.

- (2) District's review will be limited to submittal's conformance to Contract requirements including, but not limited to, coordination requirements. However, review may also include:
 - (a) Clarifications of Contract Requirements.
 - (b) Directions to include activities and information missing from submittal.
 - (c) Requests to Contractor to clarify its schedule.
- (3) Within five (5) days of the Schedule Review Meeting, Contractor shall respond in writing to all questions and comments expressed by District at the Meeting.

1.08 ADJUSTMENTS TO CPM SCHEDULE

- A. Adjustments to Original CPM Schedule: Contractor shall have adjusted the Original CPM Schedule submittal to address all review comments from original CPM Schedule review meeting and resubmit network diagrams and reports for District's review.
 - (1) District, within ten (10) days from date that Contractor submitted the revised schedule, will either:
 - (a) Accept schedule and cost and resource loaded activities as submitted, or
 - (b) Advise Contractor in writing to review any part or parts of schedule which either do not meet Contract requirements or are unsatisfactory for District to monitor Project's progress, resources, and status or evaluate monthly payment request by Contractor.
 - (2) District may accept schedule with conditions that the first monthly CPM Schedule update be revised to correct deficiencies identified.
 - (3) When schedule is accepted, it shall be considered the "Original CPM Schedule" which will then be immediately updated to reflect the current status of the work.
 - (4) District reserves right to require Contractor to adjust, add to, or clarify any portion of schedule which may later be discovered to be insufficient for monitoring of Work or approval of partial payment requests. No additional compensation will be provided for such adjustments, additions, or clarifications.
- B. Acceptance of Contractor's schedule by District will be based solely upon schedule's compliance with Contract requirements.
 - (1) By way of Contractor assigning activity durations and proposing sequence of Work, Contractor agrees to utilize sufficient and necessary management and other resources to perform work in accordance with the schedule.
 - (2) Upon submittal of schedule update, updated schedule shall be considered "current" CPM Schedule.
 - (3) Submission of Contractor's schedule to District shall not relieve Contractor of total responsibility for scheduling, sequencing, and pursuing Work to comply

with requirements of Contract Documents, including adverse effects such as delays resulting from ill timed Work.

- C. Submittal of Original CPM Schedule, and subsequent schedule updates, shall be understood to be Contractor's representation that the Schedule meets requirements of Contract Documents and that Work shall be executed in sequence indicated on the schedule.
- D. Contractor shall distribute Original CPM Schedule to Subcontractors for review and written acceptance, which shall be noted on Subcontractors' letterheads to Contractor and transmitted to District for the record.

1.09 MONTHLY CPM SCHEDULE UPDATE SUBMITTALS

- A. Following acceptance of Contractor's Original CPM Schedule, Contractor shall monitor progress of Work and adjust schedule each month to reflect actual progress and any anticipated changes to planned activities.
 - (1) Each schedule update submitted shall be complete, including all information requested for the Original CPM Schedule submittal.
 - (2) Each update shall continue to show all Work activities including those already completed. These completed activities shall accurately reflect "as built" information by indicating when activities were actually started and completed.
- B. A meeting will be held on approximately the twenty fifth (25th) of each month to review the schedule update submittal and progress payment application.
 - (1) At this meeting, at a minimum, the following items will be reviewed: Percent (%) complete of each activity; Time Impact Evaluations for Change Orders and Time Extension Request; actual and anticipated activity sequence changes; actual and anticipated duration changes; and actual and anticipated Contractor delays.
 - (2) These meetings are considered a critical component of overall monthly schedule update submittal and Contractor shall have appropriate personnel attend. At a minimum, these meetings shall be attended by Contractor's General Superintendent and Scheduler.
 - (3) Contractor shall plan on the meeting taking no less than four (4) hours.
- C. Within five (5) working days after monthly schedule update meeting, Contractor shall submit the updated CPM Schedule update.
- D. Within five (5) work days of receipt of above noted revised submittals, District will either accept or reject monthly schedule update submittal.
 - (1) If accepted, percent (%) complete shown in monthly update will be basis for Application for Payment by the Contractor. The schedule update shall be submitted as part of the Contractor's Application for Payment.
 - (2) If rejected, update shall be corrected and resubmitted by Contractor before the Application for Payment is submitted.
- E. Neither updating, changing or revising of any report, curve, schedule, or narrative submitted to District by Contractor under this Contract, nor District's review or acceptance of any such report, curve, schedule or narrative shall have the effect of

amending or modifying in any way the Completion Date or milestone dates or of modifying or limiting in any way Contractor's obligations under this Contract.

1.10 SCHEDULE REVISIONS

- A. Updating the Schedule to reflect actual progress shall not be considered revisions to the Schedule. Since scheduling is a dynamic process, revisions to activity durations and sequences are expected on a monthly basis.
- B. To reflect revisions to the schedule, the Contractor shall provide District with a written narrative with a full description and reasons for each Work activity revised. For revisions affecting the sequence of work, the Contractor shall provide a schedule diagram which compares the original sequence to the revised sequence of work. The Contractor shall provide the written narrative and schedule diagram for revisions two (2) working days in advance of the monthly schedule update meeting.
- C. Schedule revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District. District may request further information and justification for schedule revisions and Contractor shall, within three (3) days, provide District with a complete written narrative response to District's request.
- D. If the Contractor's revision is still not accepted by District, and the Contractor disagrees with District's position, the Contractor has seven (7) calendar days from receipt of District's letter rejecting the revision to provide a written narrative providing full justification and explanation for the revision. The Contractor's failure to respond in writing within seven (7) calendar days of District's written rejection of a schedule revision shall be contractually interpreted as acceptance of District's position, and the Contractor waives its rights to subsequently dispute or file a claim regarding District's position.
- E. At District's discretion, the Contractor can be required to provide Subcontractor certifications of performance regarding proposed schedule revisions affecting said Subcontractors.

1.11 RECOVERY SCHEDULE

- A. If the Schedule Update shows a completion date twenty-one (21) calendar days beyond the Contract Completion Date, or individual milestone completion dates, the Contractor shall submit to District the proposed revisions to recover the lost time within seven (7) calendar days. As part of this submittal, the Contractor shall provide a written narrative for each revision made to recapture the lost time. If the revisions include sequence changes, the Contractor shall provide a schedule diagram comparing the original sequence to the revised sequence of work.
- B. The revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District.
- C. If the Contractor's revisions are not accepted by District, District and the Contractor shall follow the procedures in paragraph 1.09.C, 1.09.D and 1.09.E above.
- D. At District's discretion, the Contractor can be required to provide Subcontractor certifications for revisions affecting said Subcontractors.

1.12 TIME IMPACTS EVALUATION ("TIE") FOR CHANGE ORDERS, AND OTHER DELAYS

- A. When Contractor is directed to proceed with changed Work, the Contractor shall prepare and submit within fourteen (14) calendar days from the Notice to Proceed a TIE which includes both a written narrative and a schedule diagram depicting how the changed Work affects other schedule activities. The schedule diagram shall show

how the Contractor proposes to incorporate the changed Work in the schedule and how it impacts the current schedule-update critical path. The Contractor is also responsible for requesting time extensions based on the TIE's impact on the critical path. The diagram must be tied to the main sequence of schedule activities to enable District to evaluate the impact of changed Work to the scheduled critical path.

- B. Contractor shall be required to comply with the requirements of Paragraph 1.09.A for all types of delays such as, but not limited to, Contractor/Subcontractor delays, adverse weather delays, strikes, procurement delays, fabrication delays, etc.
- C. Contractor shall be responsible for all costs associated with the preparation of TIEs, and the process of incorporating them into the current schedule update. The Contractor shall provide District with four (4) copies of each TIE.
- D. Once agreement has been reached on a TIE, the Contract Time will be adjusted accordingly. If agreement is not reached on a TIE, the Contract Time may be extended in an amount District allows, and the Contractor may submit a claim for additional time claimed by contractor.

1.13 TIME EXTENSIONS

- A. The Contractor is responsible for requesting time extensions for time impacts that, in the opinion of the Contractor, impact the critical path of the current schedule update. Notice of time impacts shall be given in accord with the General Conditions.
- B. Where an event for which District is responsible impacts the projected Completion Date, the Contractor shall provide a written mitigation plan, including a schedule diagram, which explains how (e.g., increase crew size, overtime, etc.) the impact can be mitigated. The Contractor shall also include a detailed cost breakdown of the labor, equipment, and material the Contractor would expend to mitigate District-caused time impact. The Contractor shall submit its mitigation plan to District within fourteen (14) calendar days from the date of discovery of the impact. The Contractor is responsible for the cost to prepare the mitigation plan.
- C. Failure to request time, provide TIE, or provide the required mitigation plan will result in Contractor waiving its right to a time extension and cost to mitigate the delay.
- D. No time will be granted under this Contract for cumulative effect of changes.
- E. District will not be obligated to consider any time extension request unless the Contractor complies with the requirements of Contract Documents.
- F. Failure of the Contractor to perform in accordance with the current schedule update shall not be excused by submittal of time extension requests.
- G. If the Contractor does not submit a TIE within the required fourteen (14) calendar days for any issue, it is mutually agreed that the Contractor does not require a time extension for said issue.

1.14 SCHEDULE REPORTS

- A. Submit four (4) copies of the following reports with the Initial CPM Schedule, the Original CPM Schedule, and each monthly update.
- B. Required Reports:
 - (1) Two activity listing reports: one sorted by activity number and one by total Project Float. These reports shall also include each activity's early/late and

actual start and finish dates, original and remaining duration, Project Float, responsibility code, and the logic relationship of activities.

- (2) Cost report sorted by activity number including each activity's associated cost, percentage of Work accomplished, earned value- to date, previous payments, and amount earned for current update period.
- (3) Schedule plots presenting time-scaled network diagram showing activities and their relationships with the controlling operations or critical path clearly highlighted.
- (4) Cash flow report calculated by early start, late start, and indicating actual progress. Provide an exhibit depicting this information in graphic form.
- (5) Planned versus actual resource (i.e., labor) histogram calculated by early start and late start.

C. Other Reports

In addition to above reports, District may request, from month to month, any two of the following reports. Submit four (4) copies of all reports.

- (1) Activities by early start.
- (2) Activities by late start.
- (3) Activities grouped by Subcontractors or selected trades.
- (4) Activities with scheduled early start dates in a given time frame, such as fifteen (15) or thirty (30) day outlook.

D. Furnish District with report files on compact disks containing all schedule files for each report generated.

1.15 PROJECT STATUS REPORTING

- A. In addition to submittal requirements for CPM scheduling identified in this Section, Contractor shall provide a monthly project status report (i.e., written narrative report) to be submitted in conjunction with each CPM Schedule as specified herein. Status reporting shall be in form specified below.
- B. Contractor shall prepare monthly written narrative reports of status of Project for submission to District. Written status reports shall include:
- (1) Status of major Project components (percent (%) complete, amount of time ahead or behind schedule) and an explanation of how Project will be brought back on schedule if delays have occurred.
 - (2) Progress made on critical activities indicated on CPM Schedule.
 - (3) Explanations for any lack of work on critical path activities planned to be performed during last month.
 - (4) Explanations for any schedule changes, including changes to logic or to activity durations.
 - (5) List of critical activities scheduled to be performed next month.

- (6) Status of major material and equipment procurement.
- (7) Any delays encountered during reporting period.
- (8) Contractor shall provide printed report indicating actual versus planned resource loading for each trade and each activity. This report shall be provided on weekly and monthly basis.
 - (a) Actual resource shall be accumulated in field by Contractor, and shall be as noted on Contractor's daily reports. These reports will be basis for information provided in computer-generated monthly and weekly printed reports.
 - (b) Contractor shall explain all variances and mitigation measures.
- (9) Contractor may include any other information pertinent to status of Project. Contractor shall include additional status information requested by District at no additional cost.
- (10) Status reports, and the information contained therein, shall not be construed as claims, notice of claims, notice of delay, or requests for changes or compensation.

1.16 WEEKLY SCHEDULE REPORT

At the Weekly Progress Meeting, the Contractor shall provide and present a time-scaled three (3) week look-ahead schedule that is based and correlated by activity number to the current schedule (i.e., Initial, Original CPM, or Schedule Update).

1.17 DAILY CONSTRUCTION REPORTS

On a daily basis, Contractor shall submit a daily activity report to District for each workday, including weekends and holidays when worked. Contractor shall develop the daily construction reports on a computer-generated database capable of sorting daily Work, manpower, and manhours by Contractor, Subcontractor, area, sub-area, and Change Order Work. Upon request of District, furnish computer disk of this data base. Obtain District's written approval of daily construction report data base format prior to implementation. Include in report:

- A. Project name and Project number.
- B. Contractor's name and address.
- C. Weather, temperature, and any unusual site conditions.
- D. Brief description and location of the day's scheduled activities and any special problems and accidents, including Work of Subcontractors. Descriptions shall be referenced to CPM scheduled activities.
- E. Worker quantities for its own Work force and for Subcontractors of any tier.
- F. Equipment, other than hand tools, utilized by Contractor and Subcontractors.

1.18 PERIODIC VERIFIED REPORTS

Contractor shall complete and verify construction reports on a form prescribed by the Division of the State Architect and file reports on the first day of February, May, August, and November during the preceding quarter year; at the completion of the Contract; at the

completion of the Work; at the suspension of Work for a period of more than one (1) month; whenever the services of Contractor or any of Contractor's Subcontractors are terminated for any reason; and at any time a special verified report is required by the Division of the State Architect. Refer to section 4-336 and section 4-343 of Part 1, Title 24 of the California Code of Regulations.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF SECTION

06/06/18

SECTION 01 33 00

SUBMITTALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Contractor's Submittals and Schedules, Drawings and Specifications;
- B. Special Conditions.

1.02 SECTION INCLUDES

A. Definitions:

- (1) Shop Drawings and Product Data are as indicated in the General Conditions and include, but are not limited to, fabrication, erection, layout and setting drawings, formwork and falsework drawings, manufacturers' standard drawings, descriptive literature, catalogues, brochures, performance and test data, wiring and control diagrams. In addition, there are other drawings and descriptive data pertaining to materials, equipment, piping, duct and conduit systems, and methods of construction as may be required to show that the materials, equipment or systems and all positions conform to the requirement of the Contract Documents, including, without limitation, the Drawings.
- (2) "Manufactured" applies to standard units usually mass-produced; "fabricated" means specifically assembled or made out of selected materials to meet design requirements. Shop Drawings shall establish the actual detail of manufactured or fabricated items, indicated proper relation to adjoining work and amplify design details of mechanical and electrical equipment in proper relation to physical spaces in the structure.
- (3) Manufacturer's Instructions: Where any item of Work is required by the Contract Documents to be furnished, installed, or performed, at a minimum, in accordance with a specified product manufacturer's instructions, the Contractor shall procure and distribute copies of these to the District, the Architect, and all other concerned parties and shall furnish, install, or perform the work, at a minimum, in accordance with those instructions.

B. Samples, Shop Drawings, Product Data, and other items as specified, in accordance with the following requirements:

- (1) Contractor shall submit all Shop Drawings, Product Data, and Samples to the District, the Architect, the Project Inspector, and the Construction Manager.
- (2) Contractor shall comply with all time frames herein and in the General Conditions and, in any case, shall submit required information in sufficient time to permit proper consideration and action before ordering any materials or items represented by such Shop Drawings, Product Data, and/or Samples.
- (3) Contractor shall comply with all time frames herein and in the General Conditions and, in any case, shall allow sufficient time so that no delay occurs due to required lead time in ordering or delivery of any item to the

Site. Contractor shall be responsible for any delay in progress of Work due to its failure to observe these requirements.

- (4) Time for completion of Work shall not be extended on account of Contractor's failure to promptly submit Shop Drawings, Product Data, and/or Samples.
- (5) Reference numbers on Shop Drawings shall have Architectural and/or Engineering Contract Drawings reference numbers for details, sections, and "cuts" shown on Shop Drawings. These reference numbers shall be in addition to any numbering system that Contractor chooses to use or has adopted as standard.
- (6) When the magnitude or complexity of submittal material prevents a complete review within the stated time frame, Contractor shall make this submittal in increments to avoid extended delays.
- (7) Contractor shall certify on submittals for review that submittals conform to Contract requirements. In event of any variance, Contractor shall specifically state in transmittal and on Shop Drawings, portions vary and require approval of a substitute. Also certify that Contractor-furnished equipment can be installed in allocated space.
- (8) Unless specified otherwise, sampling, preparation of samples, and tests shall be in accordance with the latest standard of the American Society for Testing and Materials.
- (9) Upon demand by Architect or District, Contractor shall submit samples of materials and/or articles for tests or examinations and consideration before Contractor incorporates same in Work. Contractor shall be solely responsible for delays due to sample(s) not being submitted in time to allow for tests. Acceptance or rejection will be expressed in writing. Work shall be equal to approved samples in every respect. Samples that are of value after testing will remain the property of Contractor.

C. Submittal Schedule:

- (1) Contractor shall prepare its proposed submittal schedule that is coordinated with the proposed construction schedule and submit both to the District within ten (10) days after the date of the Notice to Proceed. Contractor's proposed schedules shall become the Project Construction Schedule and the Project Submittal Schedule after each is approved by the District.
- (2) Contractor is responsible for all lost time should the initial submittal be rejected, marked "revised and resubmit", etc.
- (3) All Submittals shall be forwarded to the District by the date indicated on the approved Submittal Schedule, unless an earlier date is necessary to maintain the Construction Schedule, in which case those Submittals shall be forwarded to the District so as not to delay the Construction Schedule.

1.03 SHOP DRAWINGS

- A. Contractor shall submit one reproducible transparency and six (6) opaque reproductions. The District will review and return the reproducible copy and one (1) opaque reproduction to Contractor.

- B. Before commencing installation of any Work, the Contractor shall submit and receive approval of all drawings, descriptive data, and material list(s) as required to accomplish Work.
- C. Review of Shop Drawings is regarded as a service to assist Contractor and in all cases original Contract Documents shall take precedence as outlined under General Conditions.
- D. No claim for extra time or payment shall be based on work shown on Shop Drawings unless the claim is (1) noted on Contractor's transmittal letter accompanying Shop Drawings and (2) Contractor has complied with all applicable provisions of the General Conditions, including, without limitation, provisions regarding changes and payment, and all required written approvals.
- E. District shall not review Shop Drawings for quantities of materials or number of items supplied.
- F. District's and/or Architect's review of Shop Drawing will be general. District and/or Architect review does not relieve Contractor of responsibility for dimensions, accuracy, proper fitting, construction of Work, furnishing of materials, or Work required by Contract Documents and not indicated on Shop Drawings. Shop Drawing reviewed by District and/or Architect is not to be construed as approving departures from Contract Documents.
- G. Review of Shop Drawings and Schedules does not relieve Contractor from responsibility for any aspect of those Drawings or Schedules that is a violation of local, County, State, or Federal laws, rules, ordinances, or rules and regulations of commissions, boards, or other authorities or utilities having jurisdiction.
- H. Before submitting Shop Drawings for review, Contractor shall check Shop Drawings of its subcontractors for accuracy, and confirm that all Work contiguous with and having bearing on other work shown on Shop Drawings is accurately drawn and in conformance with Contract Documents.
- I. Submitted drawings and details must bear stamp of approval of Contractor:
 - (1) Stamp and signature shall clearly certify that Contractor has checked Shop Drawings for compliance with Drawings.
 - (2) If Contractor submits a Shop Drawing without an executed stamp of approval, or whenever it is evident (despite stamp) that Drawings have not been checked, the District and/or Architect will not consider them and will return them to the Contractor for revision and resubmission. In that event, it will be deemed that Contractor has not complied with this provision and Contractor shall bear risk of all delays to same extent as if it had not submitted any Shop Drawings or details.
- J. Submission of Shop Drawings (in either original submission or when resubmitted with correction) constitutes evidence that Contractor has checked all information thereon and that it accepts and is willing to perform Work as shown.
- K. Contractor shall pay for cost of any changes in construction due to improper checking and coordination. Contractor shall be responsible for all additional costs, including coordination. Contractor shall be responsible for costs incurred by itself, the District, the Architect, the Project Inspector, the Construction Manager, any other Subcontractor or contractor, etc., due to improperly checked and/or coordination of submittals.
- L. Shop Drawings must clearly delineate the following information:

- (1) Project name and address.
 - (2) Specification number and description.
 - (3) Architect's name and project number.
 - (4) Shop Drawing title, number, date, and scale.
 - (5) Names of Contractor, Subcontractor(s) and fabricator.
 - (6) Working and erection dimensions.
 - (7) Arrangements and sectional views.
 - (8) Necessary details, including complete information for making connections with other Work.
 - (9) Kinds of materials and finishes.
 - (10) Descriptive names of materials and equipment, classified item numbers, and locations at which materials or equipment are to be installed in the Work. Contractor shall use same reference identification(s) as shown on Contract Drawings.
- M. Contractor shall prepare composite drawings and installation layouts when required to solve tight field conditions.
- (1) Shop Drawings shall consist of dimensioned plans and elevations and must give complete information, particularly as to size and location of sleeves, inserts, attachments, openings, conduits, ducts, boxes, structural interferences, etc.
 - (2) Contractor shall coordinate these composite Shop Drawings and installation layouts in the field between itself and its Subcontractor(s) for proper relationship to the Work, the work of other trades, and the field conditions. The Contractor shall check and approve all submittal(s) before submitting them for final review.

1.04 PRODUCT DATA OR NON REPRODUCIBLE SUBMITTALS

- A. Contractor shall submit manufacturer's printed literature in original form. Any fading type of reproduction will not be accepted. Contractor must submit a minimum of six (6) each, to the District. District shall return one (1) to the Contractor, who shall reproduce whatever additional copies it requires for distribution.
- B. Contractor shall submit six (6) copies of a complete list of all major items of mechanical, plumbing, and electrical equipment and materials in accordance with the approved Submittal Schedule, except as required earlier to comply with the approved Construction Schedule. Other items specified are to be submitted prior to commencing Work. Contractor shall submit items of like kind at one time in a neat and orderly manner. Partial lists will not be acceptable.
- C. Submittals shall include manufacturer's specifications, physical dimensions, and ratings of all equipment. Contractor shall furnish performance curves for all pumps and fans. Where printed literature describes items in addition to that item being submitted, submitted item shall be clearly marked on sheet and superfluous information shall be crossed out. If highlighting is used, Contractor shall mark all copies.

- D. Equipment submittals shall be complete and include space requirements, weight, electrical and mechanical requirements, performance data, and supplemental information that may be requested.
- E. Imported Materials Certification must be submitted at least ten (10) days before material is delivered.

1.05 SAMPLES

- A. Contractor shall submit for approval Samples as required and within the time frame in the Contract Documents. Materials such as concrete, mortar, etc., which require on-site testing will be obtained from Project Site.
- B. Contractor shall submit four (4) samples except where greater or lesser number is specifically required by Contract Documents including, without limitation, the Specifications.
 - (1) Samples must be of sufficient size and quality to clearly illustrate functional characteristics, with integrally related parts and attachment devices.
 - (2) Samples must show full range of texture, color, and pattern.
- C. Contractor shall make all Submittals, unless it has authorized Subcontractor(s) to submit and Contractor has notified the District in writing to this effect.
- D. Samples to be shipped prepaid or hand-delivered to the District.
- E. Contractor shall mark samples to show name of Project, name of Contractor submitting, Contract number and segment of Work where representative Sample will be used, all applicable Specifications Sections and documents, Contract Drawing Number and detail, and ASTM or FS reference, if applicable.
- F. Contractor shall not deliver any material to Site prior to receipt of District's and/or Architect's completed written review and approval. Contractor shall furnish materials equal in every respect to approved Samples and execute Work in conformance therewith.
- G. District's and/or Architect's review, acceptance, and/or approval of Sample(s) will not preclude rejections of any material upon discovery of defects in same prior to final acceptance of completed Work.
- H. After a material has been approved, no change in brand or make will be permitted.
- I. Contractor shall prepare its Submittal Schedule and submit Samples of materials requiring laboratory tests to specified laboratory for testing not less than ninety (90) days before such materials are required to be used in Work.
- J. Samples which are rejected must be resubmitted promptly after notification of rejection and be marked "Resubmitted Sample" in addition to other information required.
- K. Field Samples and Mock-Ups are to be removed by Contractor at District's direction:
 - (1) Size: As Specified.
 - (2) Furnish catalog numbers and similar data, as requested.

1.06 REVIEW AND RESUBMISSION REQUIREMENTS

- A. The District will arrange for review of Sample(s), Shop Drawing(s), Product Data, and other submittal(s) by appropriate reviewer and return to Contractor as provided below within twenty-one (21) days after receipt or within twenty-one (21) days after receipt of all related information necessary for such review, whichever is later.
- B. One (1) copy of product or materials data will be returned to Contractor with the review status.
- C. Samples to be incorporated into the Work will be returned to Contractor, together with a written notice designating the Sample with the appropriate review status and indicating errors discovered on review, if any. Other Samples will not be returned, but the same notice will be given with respect thereto, and that notice shall be considered a return of the Sample.
- D. Contractor shall revise and resubmit any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) as required by the reviewer. Such resubmittals will be reviewed and returned in the same manner as original Sample(s), Shop Drawing(s), Product Data, and other submittal(s), within fourteen (14) days after receipt thereof or within fourteen (14) days after receipt of all related information necessary for such review. Such resubmittal shall not delay the Work.
- E. Contractor may proceed with any of the Work covered by Sample(s), Shop Drawing(s), Product Data, and other submittal(s) upon its return if designated as no exception taken, or revise as noted, provided the Contractor proceeds in accordance with the District and/or the Architect's notes and comments.
- F. Contractor shall not begin any of the work covered by a Sample(s), Shop Drawing(s), Product Data, and other submittal(s), designated as revise and resubmit or rejected, until a revision or correction thereof has been reviewed and returned to Contractor.
- G. Sample(s), Shop Drawing(s), Product Data, and other submittal(s) designated as revise and resubmit or rejected and requiring resubmittal, shall be revised or corrected and resubmitted to the District no later than fourteen (14) days or a shorter period as required to comply with the approved Construction Schedule, after its return to Contractor.
- H. Neither the review nor the lack of review of any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) shall waive any of the requirements of the Contract Documents, or relieve Contractor of any obligation thereunder.
- I. District's and/or Architect's review of Shop Drawings does not relieve the Contractor of responsibility for any errors that may exist. Contractor is responsible for the dimensions and design of adequate connections and details and for satisfactory construction of all the Work.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF SECTION

06/06/18

SECTION 01 35 13.23

SITE STANDARDS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including without limitation, Site Access, Conditions, and Regulations;
- B. Special Conditions;
- C. Drug-Free Workplace Certification;
- D. Tobacco-Free Environment Certification;
- E. Criminal Background Investigation/Fingerprinting Certification;
- F. Temporary Facilities and Controls.

1.02 REQUIREMENTS OF THE DISTRICT

- A. Drug-Free Schools and Safety Requirements:
 - (1) All school sites and other District Facilities have been declared "Drug-Free Zones." No drugs, alcohol and/or smoking are allowed at any time in any buildings and/or grounds on District property. No students, staff, visitors, or contractors are to use drugs on these sites.
 - (2) Smoking and the use of tobacco products by all persons is prohibited on or in District property. District property includes school buildings, school grounds, school owned vehicles and vehicles owned by others while on District property. Contractor shall post: "Non-Smoking Area" in a highly visible location in each work area, staging area, and parking area. Contractor may designate a smoking area outside of District property within the public right-of-way, provided that this area remains quiet and unobtrusive to adjacent neighbors. This smoking area is to be kept clean at all times.
 - (3) Contractor shall ensure that no alcohol, firearms, weapons, or controlled substances enter or are used at the Site. Contractor shall immediately remove from the Site and terminate the employment of any employee(s) found in violation of this provision.
- B. Language: Profanity or other unacceptable and/or loud language will not be tolerated, "Cat calls" or other derogatory language toward students, staff, volunteers, parents or public will not be allowed.
- C. Disturbing the Peace (Noise and Lighting):
 - (1) Contractor shall observe the noise ordinance of the Site at all times including, without limitation, all applicable local, city, and/or state laws, ordinances, and/or regulations regarding noise and allowable noise levels.

- (2) The use of radios, etc., shall be controlled to keep all sound at a level that cannot be heard beyond the immediate area of use. District reserves the right to prohibit the use of radios at the Site, except for mobile phones or other handheld communication radios.
- (3) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

D. Traffic:

- (1) Driving on the Premises shall be limited to periods when students and public are not present. If driving or deliveries must be made during the school hours, two (2) or more ground guides shall lead the vehicle across the area of travel. In no case shall driving take place across playgrounds or other pedestrian paths during recess, lunch, and/or class period changes. The speed limit on the Premises shall be five (5) miles per hour (maximum) or less if conditions require.
- (2) All paths of travel for deliveries, including without limitation, material, equipment, and supply deliveries, shall be reviewed and approved by District in advance. Any damage will be repaired to the pre-damaged condition by the Contractor.
- (3) District shall designate a construction entry to the Site. If Contractor requests, District determines it is required, and to the extent possible, District shall designate a staging area so as not to interfere with the normal functioning of school facilities. Location of gates and fencing shall be approved in advance with District and at Contractor's expense.
- (4) Parking areas shall be reviewed and approved by District in advance. No parking is to occur under the drip line of trees or in softscape areas that could otherwise be damaged.

E. All of the above shall be observed and complied with by the Contractor and all workers on the Site. Failure to follow these directives could result in individual(s) being suspended or removed from the work force at the discretion of the District. The same rules and regulations shall apply equally to delivery personnel, inspectors, consultants, and other visitors to the Site.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF SECTION

06/06/18

SECTION 01 35 16

ALTERATION PROJECT PROCEDURES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Integration of Work, Purchase of Materials and Equipment, Uncovering of Work and Non-conforming Work and Correction of Work and Trenches;
- B. Special Conditions.

PART 2 - PRODUCTS

2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK

- A. New Materials: As specified in the Contract Documents including, without limitation, in the Specifications, Contractor shall match existing products, conditions, and work for patching and extending work.
- B. Type and Quality of Existing Products: Contractor shall determine by inspection, by testing products where necessary, by referring to existing conditions and to the Work as a standard.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contractor shall verify that demolition is complete and that areas are ready for installation of new Work.
- B. By beginning restoration Work, Contractor acknowledges and accepts the existing conditions.

3.02 PREPARATION

- A. Contractor shall cut, move, or remove items as necessary for access to alterations and renovation Work. Contractor shall replace and restore these at completion.
- B. Contractor shall remove unsuitable material not as salvage unless otherwise indicated in the Contract Documents. Unsuitable material may include, without limitation, rotted wood, corroded metals, and deteriorated masonry and concrete. Contractor shall replace materials as specified for finished Work.
- C. Contractor shall remove debris and abandoned items from all areas of the Site and from concealed spaces.
- D. Contractor shall prepare surface and remove surface finishes to provide for proper installation of new Work and finishes.
- E. Contractor shall close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity. Contractor shall insulate

ductwork and piping to prevent condensation in exposed areas. Contractor shall insulate building cavities for thermal and/or acoustical protection, as detailed.

3.03 INSTALLATION

- A. Contractor shall coordinate Work of all alternations and renovations to expedite completion and to accommodate District occupancy.
- B. Designated Areas and Finishes: Contractor shall complete all installations in all respects, including operational, mechanical work and electrical work.
- C. Contractor shall remove, cut, and patch Work in a manner to minimize damage and to provide a means of restoring Products and finishes to original or specified condition.
- D. Contractor shall refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat and square or straight transition to adjacent finishes.
- E. Contractor shall install products as specified in the Contract Documents, including without limitation, the Specifications.

3.04 TRANSITIONS

- A. Where new Work abuts or aligns with existing, Contractor shall perform a smooth and even transition. Patched Work must match existing adjacent work in texture and appearance.
- B. When finished surfaces are cut so that a smooth transition with new Work is not possible, Contractor shall terminate existing surface along a straight line at a natural line of division and make a recommendation for resolution to the District and the Architect for review and approval.

3.05 ADJUSTMENTS

- A. Where removal of partitions or walls results in adjacent spaces becoming one, Contractor shall rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
- B. Where a change of plane of 1/4 inch or more occurs, Contractor shall submit a recommendation for providing a smooth transition to the District and the Architect for review and approval.
- C. Contractor shall trim and seal existing wood doors and shall trim and paint metal doors as necessary to clear new floor finish and refinish trim as required.
- D. Contractor shall fit Work at penetrations of surfaces.

3.06 REPAIR OF DAMAGED SURFACES

- A. Contractor shall patch or replace portions of existing surfaces, which are damaged, lifted, discolored, or showing other imperfections, in the area where the Work is performed.
- B. Contractor shall repair substrate prior to patching finish.

3.07 CULTIVATED AREAS AND OTHER SURFACE IMPROVEMENTS

- A. Cultivated or planted areas and other surface improvements which are damaged by actions of the Contractor shall be restored by Contractor to their original condition or better, where indicated.
- B. Contractor shall protect and replace, if damaged, all existing guard posts, barricades, and fences.
- C. Contractor shall give special attention to avoid damaging or killing trees, bushes and/or shrubs on the Premises and/or identified in the Contract Documents, including without limitation, the Drawings.

3.08 FINISHES

- A. Contractor shall finish surfaces as specified in the Contract Documents, including without limitations, the provisions of all Divisions of the Specifications.
- B. Contractor shall finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, Contractor shall refinish entire surface to nearest intersections.

3.09 CLEANING

- A. Contractor shall continually clean the Site and the Premises as indicated in the Contract Documents, including without limitation, the provisions in the General Conditions and the Specifications regarding cleaning.

END OF SECTION

06/06/18

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Obtaining of Permits, Licenses and Registrations and Work to Comply with All Applicable Laws and Regulations;
- B. Special Conditions; and
- C. Quality Control.

1.02 DESCRIPTION

- A. 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.

1.03 REQUIREMENTS OF REGULATORY AGENCIES

- A. All statutes, ordinances, laws, rules, codes, regulations, standards, and the lawful orders of all public authorities having jurisdiction over the Work, are hereby incorporated into these Contract Documents as if repeated in full herein and are intended to be included in any reference to Code or Building Code, unless otherwise specified, including, without limitation, the references in the list below. Contractor shall make available at the Site copies of all the listed documents applicable to the Work as the District and/or Architect may request, including, without limitation, applicable portions of the California Code of Regulations ("CCR").

- (1) 2016 California Building Standards Administrative Code, Part 1, Title 24, CCR.
- (2) 2016 California Building Code (CBC), Part 2, Title 24, CCR; (2015 International Building Code, Vol. 1 & 2, and 2016 California Amendments).
- (3) 2016 California Electrical Code (CEC), Part 3, Title 24, CCR; (2014 National Electrical Code and 2016 California Amendments).
- (4) 2016 California Mechanical Code (CMC), Part 4, Title 24, CCR; (2015 IAPMO Uniform Mechanical Code and 2016 California Amendments).
- (5) 2016 California Plumbing Code (CPC), Part 5, Title 24, CCR; (2015 IAPMO Uniform Plumbing Code and 2016 California Amendments).
- (6) 2016 California Energy Code (CEC), Part 6, Title 24, CCR.
- (7) 2016 California Fire Code (CFC), Part 9, Title 24, CCR; (2015 International Fire Code and 2016 California Amendments).
- (8) 2016 California Green Building Standards Code (CALGreen), Part 11, Title 24 CCR.

- (9) 2016 California Referenced Standards Code, Part 12, Title 24, CCR.
- (10) State Fire Marshal Regulations, Public Safety, Title 19, CCR.
- (11) Partial List of Applicable National Fire Protection Association (NFPA) Standards:
 - (a) NFPA 13 - Automatic Sprinkler Systems (CA amended), 2016 edition.
 - (b) NFPA 14 - Standpipe and Hose Systems, 2013 edition.
 - (c) NFPA 17A - Wet Chemical Extinguishing Systems, 2013 edition.
 - (d) NFPA 24 - Private Fire Service Mains, 2016 edition.
 - (e) NFPA 72 - National Fire Alarm and Signaling Code, (CA amended); 2016 edition.
 - (f) NFPA 253 - Critical Radiant Flux of Floor Covering System, 2015 edition.
 - (g) NFPA 2001 - Clean Agent Fire Extinguishing Systems, 2015 edition.
- (12) California Division of the State Architect interpretation of Regulations ("DSA IR"), including, without limitation:
 - (a) DSA IR A-6 — Construction Change Document Submittal and Approval Processes.
 - (b) DSA IR A-7 — Project Inspector Certification and Approval.
 - (c) DSA IR A-8 — Project Inspector and Assistant Inspector Duties and Performance.
 - (d) DSA IR A-12 — Assistant Inspector Approval.
- (13) DSA Procedures ("DSA PR")
 - (a) DSA PR 13-01 – Construction Oversight Process
 - (b) DSA PR 13-02 – Project Certification Process

B. This Project shall be governed by applicable regulations, including, without limitation, the State of California's Administrative Regulations for the Division of the State Architect-Structural Safety (DSA/SS), Chapter 4, Part 1, Title 24, CCR, and the most current version on the date the bids are opened and as it pertains to school construction including, without limitation:

- (1) Test and testing laboratory per Section 4-335. District shall pay for the testing laboratory.
- (2) Special inspections per Section 4-333(c).
- (3) Deferred Approvals per section 4-317(g).
- (4) Verified reports per Sections 4-336 & 4-343(c).
- (5) Duties of the Architect & Engineers shall be per Sections 4-333(a) and 4-341.

- (6) Duties of the Contractor shall be per Section 4-343.
- (7) Duties of Project Inspector shall be per Section 4-334.
- (8) Addenda and Construction Change Documents per Section 4-338.

Contractor shall keep and make available all applicable parts of the most current version of Title 24 referred to in the plans and specifications at the Site during construction.

C. Items of deferred approval shall be clearly marked on the first sheet of the Architect's and/or Engineer's approved Drawings. All items later submitted for approval shall be per Title 24 requirements to the DSA.

- (1) Contractor shall submit the following to Architect for review and endorsement:
 - (a) Product information on proposed material/system supplier.
 - (b) Drawings, specifications, and calculations prepared, signed, and stamped by an architect or engineer licensed in the State of California for that portion of the Work.
 - (c) All other requirements as may be required by DSA.
- (2) Cost of preparing and submitting documentation per DSA Deferred Approval requirements including required modifications to Drawings and Specifications, whether or not indicated in the Contract Documents, shall be borne by Contractor.
- (3) Contractor shall not begin fabrication and installation of deferred approval items without first obtaining DSA approval of Drawings and Specifications.
- (4) Schedule of Work Subject to DSA Deferred Approval: Window wall systems exceeding 10 feet in span.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF SECTION

06/08/18

SECTION 01 42 13

ABBREVIATIONS AND ACRONYMS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions including without limitation, Definitions;
- B. Special Conditions.

1.02 DOCUMENT INCLUDES

- A. Abbreviations used throughout the Contract Documents.
- B. Reference to a technical society, organization, or body is by abbreviation, as follows:

1.	AA	Aluminum Association
2.	AAMA	Architectural Aluminum Manufacturers Association
3.	AASHTO	American Association of State Highway and Transportation Officials
4.	ABPA	Acoustical and Board Products Association
5.	ACI	American Concrete Institute
6.	AGA	American Gas Association
7.	AGC	Associated General Contractors
8.	AHC	Architectural Hardware Consultant
9.	AI	Asphalt Institute
10.	AIA	American Institute of Architects
11.	AIEE	American Institute of Electrical Engineers
12.	AISC	American Institute of Steel Construction
13.	AISI	American Iron and Steel Institute
14.	AMCA	Air Moving and Conditioning Association
15.	ANSI	American National Standards Institute
16.	APA	APA-The Engineered Wood Association
17.	ARI	Air Conditioning and Refrigeration Institute
18.	ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
19.	ASME	American Society of Mechanical Engineers
20.	ASSE	American Society of Structural Engineers
21.	ASTM	American Society of Testing and Materials
22.	AWPB	American Wood Preservers Bureau
23.	AWPI	American Wood Preservers Institute
24.	AWS	American Welding Society
25.	AWSC	American Welding Society Code
26.	AWI	Architectural Woodwork Institute
27.	AWWA	American Water Works Association
28.	BIA	Brick Institute of America
29.	CCR	California Code of Regulations
30.	CLFMI	Chain Link Fence Manufacturers Institute
31.	CMG	California Masonry Guild
32.	CRA	California Redwood Association
33.	CRSI	Concrete Reinforcing Steel Institute
34.	CS	Commercial Standards
35.	CSI	Construction Specifications Institute

36.	CTI	Cooling Tower Institute
37.	FGMA	Flat Glass Manufacturer's Association
38.	FIA	Factory Insurance Association
39.	FM	Factory Mutual
40.	FS	Federal Specification
41.	FTI	Facing Title Institute
42.	GA	Gypsum Association
43.	ICC	International Code Council
44.	IEEE	Institute of Electrical and Electronic Engineers
45.	IES	Illumination Engineering Society
46.	LIA	Lead Industries Association
47.	MIA	Marble Institute of America
48.	MLMA	Metal Lath Manufacturers Association
49.	MS	Military Specifications
50.	NAAMM	National Association of Architectural Metal Manufacturers
51.	NBHA	National Builders Hardware Association
52.	NBFU	National Board of Fire Underwriters
53.	NBS	National Bureau of Standards
54.	NCMA	National Concrete Masonry Association
55.	NEC	National Electrical Code
56.	NEMA	National Electrical Manufacturers Association
57.	NFPA	National Fire Protection Association/National Forest Products Association
58.	NMWIA	National Mineral Wool Insulation Association
59.	NTMA	National Terrazzo and Mosaic Association
60.	NWMA	National Woodwork Manufacturer's Association
61.	ORS	Office of Regulatory Services (California)
62.	OSHA	Occupational Safety and Health Act
63.	PCI	Precast Concrete Institute
64.	PCA	Portland Cement Association
65.	PDCA	Painting and Decorating Contractors of America
66.	PDI	Plumbing Drainage Institute
67.	PEI	Porcelain Enamel Institute
68.	PG&E	Pacific Gas & Electric Company
69.	PS	Product Standards
70.	SDI	Steel Door Institute; Steel Deck Institute
71.	SJI	Steel Joist Institute
72.	SSPC	The Society for Protective Coatings
73.	TCNA	Tile Council of North America
74.	TPI	Truss Plate Institute
75.	UBC	Uniform Building Code
76.	UL	Underwriters Laboratories Code
77.	UMC	Uniform Mechanical Code
78.	USDA	United States Department of Agriculture
79.	VI	Vermiculite Institute
80.	WCLA	West Coast Lumberman's Association
81.	WCLB	West Coast Lumber Bureau
82.	WEUSER	Western Electric Utilities Service Engineering Requirements
83.	WI	Woodwork Institute
84.	WPOA	Western Plumbing Officials Association

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

SECTION 01 42 16

DEFINITIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions including without limitation, Definitions;
- B. Special Conditions.

1.02 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or Federal Standards, Contractor shall comply with requirements of the standard, except when more rigid requirements are specified in the Contract Documents, or are required by applicable codes.
- B. Contractor shall conform to current reference standard publication date in effect on the date of bid opening.
- C. Contractor shall obtain copies of standards unless specifically required not to by the Contract Documents.
- D. Contractor shall maintain a copy of all standards at jobsite during submittals, planning, and progress of the specific Work, until final completion, unless specifically required not to by the Contract Documents.
- E. Should specified reference standards conflict with Contract Documents, Contractor shall request clarification from the District and/or the Architect before proceeding.
- F. The contractual relationship of the parties to the Contract shall not be altered from the contractual relationship as indicated in the Contract Documents by mention or inference otherwise in any referenced document.
- G. Governing Codes shall be as shown in the Contract Documents including, without limitation, the Specifications.

END OF SECTION

06/06/18

SECTION 01 42 19

REFERENCES

PART 1 - GENERAL

1.01 SCHEDULE OF REFERENCES

The following information is intended only for the general assistance of the Contractor, and the District does not represent that all of the information is current. It is the Contractor's responsibility to verify the correct information for each of the entities listed.

AA	Aluminum Association 1525 Wilson Blvd., Suite 600 Arlington, VA 22209 www.aluminum.org	703/358-2960
AABC	Associated Air Balance Council 1518 K Street, NW, Suite 503 Washington, DC 20005 www.aabchq.com	202/737-0202
AAMA	American Architectural Manufacturers Association 1827 Walden Office Sq., Suite 550 Schaumburg, IL 60173-4268 www.aamanet.org	847/303-5664
AASHTO	American Association of State Highway and Transportation Officials 444 N Capitol St. NW - Suite 249 Washington, DC 20001 www.transportation.org	202/624-5800
AATCC	American Association of Textile Chemists and Colorists P.O. Box 12215 One Davis Drive Research Triangle Park, NC 27709 2215 www.aatcc.org	919/549-8141
ACA	American Coatings Association 1500 Rhode Island Ave., NW Washington DC, 20005 www.paint.org	202/462-6272
ACI	American Concrete Institute 38800 Country Club Dr. Farmington Hills, MI 48331-3439 www.aci-int.org	248/848-3700
ACPA	American Concrete Pipe Association 8445 Freeport Parkway, Suite 350 Irving, TX 75063-2595 www.concrete-pipe.org	972/506-7216

ADC	Air Diffusion Council 1901 N. Roselle Road, Suite 800 Schaumburg, Illinois 60195 www.flexibleduct.org	847/706-6750
AF&PA	American Forest and Paper Association 1111 Nineteenth Street, NW, Suite 800 Washington, DC 20036 www.afandpa.org	202/463-2700
AGA	American Gas Association 400 North Capitol Street, NW Washington, DC 20001 www.aga.org	202/824-7000
AGC	Associate General Contractors of America 2300 Wilson Blvd., Suite 400 Arlington, VA 22201 www.agc.org	703/548-3118
AHA	American Hardboard Association 1210 West Northwest Highway Palatine, IL 60067 domensino.com/AHA/default.htm	847/934-8800
AI	Asphalt Institute 2696 Research Park Drive Lexington, KY 40511-8480 www.asphaltinstitute.org	859/288-4960
AIA	The American Institute of Architects 1735 New York Ave., NW Washington, DC 20006-5292 www.aia.org	202/626-7300
AISC	American Institute of Steel Construction One East Wacker Drive Suite 700 Chicago, IL 60601-1802 www.aisc.org	312.670.2400
AIA	American Insurance Association (formerly the National Board of Fire Underwriters) 2101 L Street, NW, Suite 400 Washington, DC 20037 www.aiadc.org	202/828-7100
ISI	American Iron and Steel Institute 25 Massachusetts Ave., NW, Suite 800 Washington, DC 20001 www.steel.org	202/452.7100
AITC	American Institute of Timber Construction 7012 S. Revere Parkway Suite 140 Centennial, CO 80112 www.aitc-glulam.org	303/792.9559

ALI	Associated Laboratories, Inc. P.O. Box 152837 Dallas, TX 75315 www.assoc-labs.com	214/565-0593
ALSC	American Lumber Standards Committee, Inc. P.O. Box 210 Germantown, MD 20875 www.alsc.org	301/972-1700
AMCA	Air Movement and Control Association International, Inc. 30 W. University Drive Arlington Heights, IL 60004 www.amca.org	847/394-0150
ANLA	American Nursery & Landscape Association 1200 G Street NW, Suite 800 Washington, DC 20005 www.anla.org	202/789-2900
ANSI	American National Standards Institute 1899 L Street, NW, 11th Floor Washington, DC, 20036 www.ansi.org	202/293.8020
APA	APA-The Engineered Wood Association 7011 S. 19th Street Tacoma, WA 98466-5333 www.apawood.org	253/565-6600
APA	Architectural Precast Association 6710 Winkler Road, Suite 8 Fort Myers, Florida 33919 www.archprecast.org	239/454-6989
ARI	Air Conditioning and Refrigeration Institute 4100 N. Fairfax Drive, Suite 200 Arlington, VA 22203 www.lightindustries.com/ARI	703/524-8800
ARMA	Asphalt Roofing Manufacturers Association Public Information Department 750 National Press Building 529 14th Street, NW Washington, DC 20045 www.asphaltroofing.org	202/591-2450
ASA	The Acoustical Society of America ASA Office Manager Suite 1NO1 2 Huntington Quadrangle Melville, NY 11747-4502 http://asa.aip.org	516/576-2360

ASCE	American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191 www.asce.org	800/548-2723 703/295-6300
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 1791 Tullie Circle, NE Atlanta, GA 30329-2305 www.ashrae.org	800/527-4723 404/636-8400
ASLA	American Society of Landscape Architects 636 Eye Street, NW Washington, DC 20001-3736 www.asla.org	202/898-2444
ASME	American Society of Mechanical Engineers Three Park Avenue New York, NY 10016-5990 www.asme.org	800/434-2763
ASPE	American Society of Plumbing Engineers 2980 S River Rd. Des Plaines, IL 60018 http://aspe.org	847/296-0002
ASQ	American Society for Quality P.O. Box 3005 Milwaukee, WI 53201-3005 or 600 North Plankinton Avenue Milwaukee, WI 53203 http://asq.org	800/248-1946 414/272-8575
ASSE	American Society of Sanitary Engineering 901 Canterbury, Suite A Westlake, Ohio 44145 www.asse-plumbing.org	440/835-3040
ASTM	ASTM International 100 Barr Harbor Drive PO Box C700 West Conshohocken, PA, 19428-2959 www.astm.org	610/832-9500
AWCI	Association of the Wall and Ceiling Industry 513 West Broad Street, Suite 210 Falls Church, VA 22046 www.awci.org	703/538-1600
AWPA	American Wood Protection Association P.O. Box 361784 Birmingham, AL 35236-1784 www.awpa.com	205/733-4077

AWPI	American Wood Preservers Institute 2750 Prosperity Ave. Suite 550 Fairfax, VA 22031-4312 www.arcat.com	800/356-AWPI 703/204-0500
AWS	American Welding Society 8669 Doral Boulevard, Suite 130 Doral, Florida 33166 www.aws.org	800/443-9353 305/443-9353
AWI	Architectural Woodwork Institute 46179 Westlake Drive, Suite 120 Potomac Falls, VA 20165-5874 www.awinet.org	571/323-3636
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235 www.awwa.org	800/926-7337 303/794 7711
BHMA	Builders Hardware Manufacturers Association 355 Lexington Avenue, 15th floor New York, NY 10017 www.buildershardware.com	212/297-2122
BIA	The Brick Industry Association 1850 Centennial Park Drive, Suite 301 Reston, VA 20191 www.gobrick.com	703/620-0010
CGA	Compressed Gas Association 14501 George Carter Way, Suite 103 Chantilly VA 20151-2923 www.cganet.com	703/788-2700
CISCA	Ceilings & Interior Systems Construction Association 1010 Jorie Blvd, Suite 30 Oak Brook, IL 60523 www.cisca.org	630/584-1919
CISPI	Cast Iron Soil Pipe Institute 1064 Delaware Avenue SE Atlanta, GA 30316 www.cispi.org	404/622-0073
CLFMI	Chain Link Fence Manufacturers Institute 10015 Old Columbia Road, Suite B-215 Columbia, MD 21046 www.associationsites.com/main-pub.cfm?usr=clfma	410/290-6267
CPA	Composite Panel Association 19465 Deerfield Avenue, Suite 306 Leesburg, VA 20176 www.compositepanel.org	703/724-1128

CPSC	Consumer Product Safety Commission 4330 East West Highway Bethesda, MD 20814 www.cpsc.gov	301/504-7923 800/638-2772
CRA	California Redwood Association 405 Enfrente Drive, Suite 200 Novato, CA 94949 www.calredwood.org	415/382-0662
CRI	Carpet and Rug Institute P.O. Box 2048 Dalton, Georgia 30722-2048 www.carpet-rug.org	706/278-3176
CRSI	Concrete Reinforcing Steel Institute 933 N. Plum Grove Road Schaumburg, IL 60173 4758 www.crsi.org	847/517-1200
CSI	The Construction Specifications Institute 110 South Union Street, Suite 100 Alexandria VA 22314 www.csinet.org	800/689-2900
CTIOA	Ceramic Tile Institute of America 12061 Jefferson Blvd. Culver City, CA 90230-6219 www.ctioa.org	310/574-7800
DHI	Door and Hardware Institute (formerly National Builders Hardware Association) 14150 Newbrook Dr. Chantilly, VA 20151 www.dhi.org	703/222-2010
DIPRA	Ductile Iron Pipe Research Association 2000 2nd Avenue, South Suite 429 Birmingham, AL 35233 www.dipra.org	205/402-8700
DOC	U.S. Department of Commerce 1401 Constitution Ave., NW Washington, D.C. 20230 www.commerce.gov	202/482-2000
DOT	U.S. Department of Transportation 1200 New Jersey Avenue, SE Washington, DC 20590 www.dot.gov	855/368-4200
EJMA	Expansion Joint Manufacturers Association, Inc. 25 North Broadway Tarrytown, NY 10591 www.ejma.org	914/332-0040

EPA	Environmental Protection Agency Ariel Rios Building 1200 Pennsylvania Avenue, N.W. Washington, DC 20460 www.epa.gov	202/272-0167
FCICA	Floor Covering Installation Contractors Association 7439 Millwood Drive West Bloomfield, MI 48322 www.fcica.com	248/661-5015 877/TO-FCICA
FM Global	Factory Mutual Insurance Company Mary Breighner Global Practice Leader Education, Public Entities, Health Care FM Global 9 Woodcrest Court Cincinnati, OH 45246 www.fmglobal.com	513/742-9516
FS	General Services Administration (GSA) Index of Federal Specifications, Standards and Commercial Item Descriptions 470 East L'Enfant Plaza, SW, Suite 8100 Washington, DC 20407 www.gsa.gov	202/619-8925
GA	The Gypsum Association 6525 Belcrest Road, Suite 480 Hyattsville, MD 20782 www.gypsum.org	301/277-8686
GANA	Glass Association of North America 800 SW Jackson St., Suite 1500 Topeka, KS 66612-1200 www.glasswebsite.com	785/271-0208
HMA	Hardwood Manufacturers Association 665 Rodi Road, Suite 305 Pittsburgh, PA 15235 http://hmamembers.org	412/244-0440
HPVA	Hardwood Plywood & Veneer Association 1825 Michael Faraday Drive Reston, Virginia 20190 www.hpva.org	703/435-2900

IAPMO	International Association of Plumbing and Mechanical Officials (formerly the Western Plumbing Officials Association) 4755 E. Philadelphia St. Ontario, CA 91761 www.iapmo.org	909/472-4100
ICC	International Code Council 500 New Jersey Avenue, NW, 6th Floor Washington, DC 20001 www.iccsafe.org	888/422-7233
IEEE	Institute of Electrical and Electronics Engineers 3 Park Avenue, 17th Floor New York, NY 10016-5997 www.ieee.org	212/419-7900
IES	Illuminating Engineering Society 120 Wall Street, Floor 17 New York, NY 10005-4001 www.ies.org	212/248-5000
ITRK	Intertek Testing Services 3933 US Route 11 Cortland, NY 13045 www.intertek.com	607/753-6711
MCAA	Mechanical Contractors Association of America 1385 Piccard Drive Rockville, MD 20850 www.mcaa.org	301/869-5800
MIA	Marble Institute of America 28901 Clemens Rd, Ste 100 Cleveland, OH 44145 www.marble-institute.com	440/250-9222
MMPA (formerly WMMPA)	Moulding & Millwork Producers Association (formerly Wood Moulding & Millwork Producers Association) 507 First Street Woodland, CA 95695 www.wmmpa.com	530/661-9591 800/550-7889
MSS	Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry 127 Park Street, NE Vienna, VA 22180-4602 http://mss-hq.org	703/281-6613
NAAMM	National Association of Architectural Metal Manufacturers 800 Roosevelt Rd. Bldg. C, Suite 312 Glen Ellyn, IL 60137 www.naamm.org	630/942-6591

NAIMA	North American Insulation Manufacturers Association 44 Canal Center Plaza, Suite 310 Alexandria, VA 22314 www.naima.org	703/684-0084
NAPA	National Asphalt Pavement Association 5100 Forbes Blvd. Lanham, MD USA 20706-4407 www.asphalt pavement.org	888/468-6499 301/731-4748
NCSPA	National Corrugated Steel Pipe Association 14070 Proton Road, Suite 100 LB9 Dallas, TX 75244 www.ncspa.org	972/850-1907
NCMA	National Concrete Masonry Association 13750 Sunrise Valley Drive Herndon, VA 20171-4662 www.ncma.org	703/713-1900
NEBB	National Environmental Balancing Bureau 8575 Grovemont Circle Gaithersburg, MD 20877 www.nebb.org	301/977-3698
NECA	National Electrical Contractors Association 3 Bethesda Metro Center, Suite 1100 Bethesda, MD 20814 www.necanet.org	301/657-3110
NEMA	National Electrical Manufacturers Association 1300 North 17th Street, Suite 1752 Rosslyn, Virginia 22209 www.nema.org	703/841-3200
NEII	National Elevator Industry, Inc. 1677 County Route 64 P.O. Box 838 Salem, New York 12865-0838 www.neii.org	518/854-3100
NFPA	National Fire Protection Association 1 Batterymarch Park Quincy, Massachusetts USA 02169-7471 www.nfpa.org	617/770-3000
NHLA	National Hardwood Lumber Association PO Box 34518 Memphis, TN 38184 www.nhla.com	901/377-1818

NIA	National Insulation Association 12100 Sunset Hills Road, Suite 330 Reston, VA 20190 www.insulation.org	703/464-6422
NRCA	National Roofing Contractors Association 10255 W. Higgins Road, Suite 600 Rosemont, IL 60018-5607 www.nrca.net	847/299-9070
NSF	NSF International P.O. Box 130140 789 N. Dixboro Road Ann Arbor, MI 48113-0140, USA www.nsf.org	800/673-6275 734/769-8010
NTMA	National Terrazzo and Mosaic Association PO Box 2605 Fredericksburg, TX 78624 www.ntma.com	800/323-9736
OSHA	Occupational Safety and Health Act U.S. Department of Labor Occupational Safety & Health Administration 200 Constitution Ave., NW Washington, D.C. 20210 www.osha.gov	800/321- OSHA (6742)
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077 or 500 New Jersey Ave., N.W. 7 th Floor Washington, D.C. 20001 www.cement.org	847/966-6200 202/408-9494
PCI	Precast/Prestressed Concrete Institute 200 W. Adams St. #2100 Chicago, IL 60606 www.pci.org	312/786-0300
PDCA	Painting and Decorating Contractors of America 2316 Millpark Drive, Ste 220 Maryland Heights, MO 63043 www.pdca.com	800/332- PDCA (7322) 314/514-7322
PDI	Plumbing & Drainage Institute 800 Turnpike Street, Suite 300 North Andover, MA 01845 http://pdionline.org	978/557-0720 800/589-8956
PEI	Porcelain Enamel Institute, Inc. P.O. Box 920220 Norcross, GA 30010 www.porcelainenamel.com	770/676-9366

PG&E	Pacific Gas & Electric Company www.pge.com	800/743-5000
PLANET	Professional Landcare Network 950 Herndon Parkway, Suite 450 Herndon, Virginia 20170 www.landcarenetwork.org	703/736-9666 800/395-2522 703/736-9668
RFCI	Resilient Floor Covering Institute 115 Broad Street, Suite 201 La Grange GA 30240 www.rfci.com	706/882-3833
RIS	Redwood Inspection Service 818 Grayson Road, Suite 201 Pleasant Hill, CA 94523 www.redwoodinspection.com	925/935-1499
SDI	Steel Deck Institute P.O. Box 25 Fox River Grove, IL 60021 www.sdi.org	847/458-4647
SDI	Steel Door Institute 30200 Detroit Road Westlake, Ohio 44145 www.steeldoor.org	440/899-0010
SJI	Steel Joist Institute 234 W. Cheves Street Florence, SC 29501 http://steeljoist.org	843/407-4091
SMA	Stucco Manufacturers Association 500 East Yale Loop Irvine, CA 92614 www.stuccomfgassoc.com	949/387.7611
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association 4201 Lafayette Center Drive Chantilly, Virginia 20151-1219 www.smacna.org	703/803-2980
SPI	SPI: The Plastics Industry Trade Association, Inc. 1667 K St., NW, Suite 1000 Washington, DC 20006 www.plasticsindustry.org	202/974-5200
SSPC	Society for Protective Coatings (formerly the Steel Structures Painting Council) 40 24th St 6th Fl Pittsburgh, PA 15222 www.sspc.org	412/281-2331 877/281-7772

TCNA	The Tile Council of North America 100 Clemson Research Blvd. Anderson, SC 29625 www.tcnatile.com	864/646-8453
TPI	Truss Plate Institute 218 North Lee Street, Suite 312 Alexandria, VA 22314 www.tpinst.org	703/683-1010
TPI	Turfgrass Producers International 2 East Main Street East Dundee, IL 60118 www.turfgrasssod.org	800/405-8873 847/649-5555
TCIA	Tree Care Industry Association (formerly the National Arborist Association) 136 Harvey Road, Suite 101 Londonderry, NH 03053 www.tcia.org	800/733-2622
TVI	The Vermiculite Institute c/o The Schundler Company 150 Whitman Avenue Edison, NJ. 08817 www.vermiculiteinstitute.org	732/287-2244
UL	Underwriters Laboratories Inc. 333 Pfingsten Road Northbrook, IL 60062-2096 www.ul.com	847/272-8800 877/854-3577
UNI	Uni-Bell PVC Pipe Association 2711 LBJ Freeway, Suite 1000 Dallas, TX 75234 www.uni-bell.org	972/243-3902
USDA	U.S. Department of Agriculture 1400 Independence Ave., S.W. Washington, DC 20250 www.usda.gov	202/720-2791
WA	Wallcoverings Association 401 North Michigan Avenue Suite 2200 Chicago, IL 60611 www.wallcoverings.org	312/321-5166

WCLIB	West Coast Lumber Inspection Bureau P.O. Box 23145 Portland, OR 97281 or 6980 S.W. Varns Tigard, OR 97223 www.wclib.org	503/639-0651
WCMA	Window Covering Manufacturers Association 355 Lexington Avenue 15th Floor New York, New York 10017 www.wcmanet.org	212/297-2122
WDMA	Window & Door Manufacturers Association 401 N. Michigan Avenue, Suite 2200 Chicago, IL 60611 or 2025 M Street, NW, Ste. 800 Washington, D.C. 20036-3309 www.wdma.com	312/321-6802 202/367-1157
WI	Woodwork Institute P.O. Box 980247 West Sacramento, CA 95798 www.wicnet.org	916/372-9943
WRI	Wire Reinforcement Institute 942 Main Street Hartford, CT 06103 www.wirereinforcementinstitute.org	860/240-9545
WWCA	Western Wall & Ceiling Contractors Association 1910 N. Lime St. Orange, California 92865 www.wwcca.org	714/221-5520
WWPA	Western Wood Products Association 522 SW Fifth Ave., Suite 500 Portland, OR 97204-2122 www2.wwpa.org	503/224-3930

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF SECTION

06/06/18

SECTION 01 45 00

QUALITY CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Inspector, Inspections and Tests, Uncovering of Work and Non-conforming of Work and Correction of Work;
- B. Special Conditions.

1.02 RELATED CODES

- A. The Work is governed by requirements of Title 24, California Code of Regulations ("CCR"), and the Contractor shall keep a copy of these available at the job Site for ready reference during construction.
- B. The Division of the State Architect ("DSA") shall be notified at or before the start of construction.

1.03 OBSERVATION AND SUPERVISION

- A. The District and Architect or their appointed representatives will review the Work and the Contractor shall provide facilities and access to the Work at all times as required to facilitate this review. Administration by the Architect and any consulting Structural Engineer will be in accordance with applicable regulations, including, without limitation, CCR, Part 1, Title 24, Section 4-341.
- B. One or more Project Inspector(s) approved by DSA and employed by or in contract with the District, referred to hereinafter as the "Project Inspector", will observe the work in accordance with CCR, Part 1, Title 24, Sections 4-333(b) and 4-342:
 - (1) The Project Inspector and Special Inspector(s) shall have access to the Work wherever it is in preparation or progress for ascertaining that the Work is in accordance with the Contract Documents and all applicable code sections. The Contractor shall provide facilities and operation of equipment as needed, and access as required and shall provide assistance for sampling or measuring materials.
 - (2) The Project Inspector will notify the District and Architect and call the attention of the Contractor to any observed failure of Work or material to conform to Contract Documents.
 - (3) The Project Inspector shall observe and monitor all testing and inspection activities required.

The Contractor shall conform with all applicable laws as indicated in the Contract Documents, including, without limitation, to CCR, Part 1, Title 24, Section 4-343. The Contractor shall supervise and direct the Work and maintain a competent superintendent on the job who is authorized to act in all matters pertaining to the Work. The Contractor's superintendent shall also inspect all materials, as they arrive, for compliance with the Contract Documents. Contractor shall reject defective Work or materials immediately upon delivery or failure of the Work or material to comply with the Contract Documents. The Contractor shall submit

verified reports as indicated in the Contract Documents, including, without limitation, the Specifications and as required by Part 1, Title 24, Section 4-336.

1.04 TESTING AGENCIES

- A. Testing agencies and tests shall be in conformance with the General Documents and the requirements of Part 1, Title 24, Section 4- 335.
- B. Testing and inspection in connection with earthwork shall be under the direction of the District's consulting soils engineer, if any, referred to hereinafter as the "Soils Engineer."
- C. Testing and inspection of construction materials and workmanship shall be performed by a qualified laboratory, referred to hereinafter as the "Testing Laboratory." The Testing Laboratory shall be under direction of an engineer registered in the State of California, shall conform to requirements of ASTM E329, and shall be employed by or in contract with the District.

1.05 TESTS AND INSPECTIONS

- A. The Contractor shall be responsible for notifying the District and Project Inspector of all required tests and inspections. Contractor shall notify the District and Project Inspector at least seventy-two hours (72) hours in advance of performing any Work requiring testing or inspection.
- B. The Contractor shall provide access to Work to be tested and furnish incidental labor, equipment, and facilities to facilitate all inspections and tests.
- C. The District will pay for first inspections and tests required by the "CCR", and other inspections or tests that the District and/or the Architect may direct to have made, including the following principal items:
 - (1) Tests and observations for earthwork and paving.
 - (2) Tests for concrete mix designs, including tests of trial batches.
 - (3) Tests and inspections for structural steel work.
 - (4) Field tests for framing lumber moisture content.
 - (5) Additional tests directed by the District that establish that materials and installation comply with the Contract Documents.
 - (6) Test and observation of welding and expansion anchors.
- D. The District may at its discretion, pay and then back charge the Contractor for:
 - (1) Retests or reinspections, if required, and tests or inspections required due to Contractor error or lack of required identifications of material.
 - (2) Uncovering of work in accordance with Contract Documents.
 - (3) Testing done on weekends, holidays, and overtime will be chargeable to the Contractor for the overtime portion.
 - (4) Testing done off Site.
- E. Testing and inspection reports and certifications:

- (1) If initially received by Contractor, Contractor shall provide to each of the following a copy of the agency or laboratory report of each test or inspection or certification.
 - (a) The District;
 - (b) The Construction Manager, if any;
 - (c) The Architect;
 - (d) The Consulting Engineer, if any;
 - (e) Other engineers on the Project, as appropriate;
 - (f) The Project Inspector; and
 - (g) The Contractor.
- (2) When the test or inspection is one required by the CCR, a copy of the report shall also be provided to the DSA.

PART 2 - PRODUCTS

2.01 TEST AND INSPECTIONS

- A. Tests and inspections will be required in accordance with the 2016 CBC, unless otherwise specified: Refer to attached DSA-103 – Listing of Structural Tests and Special Inspections – 2016 CBC.

PART 3 - EXECUTION Not Used.

END OF SECTION

06/06/18



DSA-103 Issued 9/1/2017

List of Required Structural Tests & Special Inspections - 2016 CBC

INCREMMENT # DSA File No.: 21-H1
 Application No.: 01-117586
 Date Submitted: 6/8/2018 Revised:
 Revised:

School Name	Terra Linda High School - Innovation Hub	District	San Rafael City Schools

IMPORTANT: This form is only a summary list of structural tests and some of the special inspections required for the project. Generally, the structural tests and special inspections noted on this form are those that will be performed by the Geotechnical Engineer of Record, Laboratory of Record, or Special Inspector. The actual complete test and inspection program must be performed as detailed on the DSA approved documents. The appendix at the bottom of this form identifies work NOT subject to DSA requirements for special inspection or structural testing. The project inspector is responsible for providing inspection of all facets of construction, including but not limited to, special inspections not listed on this form such as structural wood framing, high-load wood diaphragms, cold-formed steel framing, anchorage of non-structural components, etc., per Title 24, Part 2, Chapter 17A.

NOTE: This form is also available for projects submitted for review under the 2007, 2010, and 2013 CBC.

INSTRUCTIONS: Click a plus sign (+) before any category or subcategory to reveal additional tests and special inspections. A shaded box indicates a test or special inspection that may be required, depending on the scope of the construction and other issues. A shaded box can be clicked indicating your selection of that test. **Note:** A minus (-) on a category or subcategory heading indicates that it can be collapsed. However, any selections you may have made will be cleared. Click on the "COMPILE" button to show only the tests and inspections finally selected. For more information on use of this form, see DSA-103.INSTR.

TEST OR SPECIAL INSPECTION		TYPE 1	PERFORMED BY 2	CODE REFERENCE AND NOTES
SOILS				
-	1. GENERAL:	Table 1705A.6		
X	a. Verify that: • site has been prepared properly prior to placement of controlled fill and/or excavations for foundations, • foundation excavations are extended to proper depth and have reached proper material, and • materials below footings are adequate to achieve the design bearing capacity.	Periodic	GE*	* By geotechnical engineer or his or her qualified representative. (See Appendix for exemptions.)
CONCRETE				
-	7. CAST IN PLACE CONCRETE	Table 1705A.3, ACI 318-14 Sections 26.12 & 26.13		
Material Verification and Testing:				
X	a. Verify use of required design mix.	Periodic	SI*	Table 1705A.3 Item 5, 1910A.1 (1909.2.3)*. * To be performed by qualified batch-plant inspector and concrete sampling technician
X	b. Identify, sample, and test reinforcing steel.	Test	LOR	1910A.2 (1909.2.4)*; ACI 318-14 Section 26.6.1.2. DSA IR 17-10.16
X	c. During concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	Test	LOR	Table 1705A.3 item 6; ACI 318-14 Sections 26.5 & 26.12
X	d. Test concrete (f _c).	Test	LOR	1905A.1.16 (1909.3.7)*; ACI 318-14 Section 26.12.
Inspection:				
X	e. Batch plant inspection	Continuous	SI	Default of 'Continuous' per 1705A.3.3; If approved by DSA, batch plant inspection may be reduced to 'Periodic' subject to requirements in Section 1705A.3.3.1 or eliminated per 1705A.3.3.2. (See Appendix for exemptions.)

DSA-103

(Issued 9-1-17)

+ In the CODE REFERENCE AND NOTES column indicates DSA-SS/CC sections that may be used by community colleges, per 2016 CBC Sec. 1.9.2.2.

Issued 9/1/2017

DSA-103



List of Required Structural Tests & Special Inspections - 2016 CBC

INCREMMENT # DSA File No.: 21-H1
 Application No.: 01-117586
 Date Submitted: 6/8/2013 Revised:
 Revised:

TMS 402-13/ACI 530-13/ASCE 5-13 Table 3.1.3 & TMS 602-13/ACI 530.1-13/ASCE 6-13 Table 5				
Table 1705A.2.1, AISC 303-10, AISC 360-10, AISC 341-10, AISC 358-10, AISI S100-07/S2-10				
17. STRUCTURAL STEEL, COLD-FORMED STEEL, AND ALUMINUM USED FOR STRUCTURAL PURPOSES				
Material Verification:				
X	a. Verify identification of all materials and: • Mill certificates indicate material properties that comply with requirements, • Material sizes, types and grades comply with requirements.	Periodic	*	2203A.1 (2203.1*), Table 1705A.2.1 Item 3a-3c; AISI S100-07/S2-10 Section A2.1 & A2.2, AISI S200-12 Section A3, AISI S220-11 Section A4. * By special inspector or qualified technician when performed off-site.
X	b. Test unidentified materials	Test	LOR	2203A.1 (2203.1*)
X	c. Examine seam welds of HSS shapes	Periodic	SI	DSA IR 17-3.
Inspection:				
X	e. Verify and document steel fabrication per DSA approved construction documents.	Periodic	SI	Not applicable to cold-formed steel light-frame construction, except for trusses (1705A.2.4).
19. WELDING:				
Verification of Materials, Equipment, Welders, etc:				
X	a. Verify weld filler material identification markings per AWS designation listed on the DSA approved documents and the WPS.	Periodic	SI	DSA IR 17-3.
X	b. Verify weld filler material manufacturer's certificate of compliance.	Periodic	SI	DSA IR 17-3.
X	c. Verify WPS, welder qualifications and equipment.	Periodic	SI	DSA IR 17-3.
19.1 SHOP WELDING:				
X	a. Inspect groove welds, multi-pass fillet welds, single pass fillet welds > 5/16", plug and slot welds	Continuous	SI	Table 1705A.2.1 Item 5a1-4. Per AISC 360-10 (and AISC 341-10 as applicable). DSA IR 17-3.
X	b. Inspect single-pass fillet welds ≤ 5/16", floor and roof deck welds	Periodic	SI	1705A.2.2, Table 1705A.2.1 Item 5a.5 & 5a.6. Per AISC 360-10 (and AISC 341-10 as applicable). DSA IR 17-3.
19.2 FIELD WELDING:				
X	a. Inspect groove welds, multi-pass fillet welds, single pass fillet welds > 5/16", plug and slot welds	Continuous	SI	Table 1705A.2.1 Item 5a1-4. Per AISC 360-10 (and AISC 341-10 as applicable). DSA IR 17-3.
X	b. Inspect single-pass fillet welds ≤ 5/16"	Periodic	SI	Table 1705A.2.1 Item 5a.5. Per AISC 360-10 (and AISC 341-10 as applicable). DSA IR 17-3.
23. ANCHOR BOLTS, ANCHOR RODS, & OTHER STEEL:				
X	a. Anchor Bolts and Anchor Rods	Test	LOR	IR 17-11 Sample and test anchor bolts and anchor rods not readily identifiable.
WOOD				
OTHER				

DSA-103 Issued 9/1/2017



List of Required Structural Tests & Special Inspections - 2016 CBC

INCREMMENT # DSA File No.: 21-H1
 Application No.: 01-117586
 Date Submitted: 6/8/2018 Revised:
 Revised:

List of required verified report(s):

1. Soils testing and inspection: Geotechnical Verified Report - Form DSA-293
2. All Structural Testing: Laboratory Verified Report - Form DSA-291
3. Concrete Batch Plant Inspection: Laboratory Verified Report - Form DSA-291
4. Shop Welding Inspection: Laboratory Verified Report - Form DSA-291, or, for independently contracting SI, Special Inspection Verified Report - Form DSA-292
5. Field Welding Inspection: Laboratory Verified Report - Form DSA-291, or, for independently contracting SI, Special Inspection Verified Report - Form DSA-292

KEY to Columns

1	Type -	2	Performed By -
Continuous	Indicates that a continuous special inspection is required	GE	Indicates that the special inspection is to be performed by a registered geotechnical engineer or his or her authorized representative
Periodic	Indicates that a periodic special inspection is required	LOR	Indicates that the test or inspection is to be performed by a testing laboratory accepted in the DSA Laboratory Evaluation and Acceptance (LEA) Program. See section 4-335, 2013 CCR Title 24, Part 1.
Test	Indicates that a test is required	SI	Indicates that the special inspection is to be performed by a special inspector

Name of Architect or Engineer in general responsible charge

TIMOTHY L. FRET

Name of Structural Engineer (When structural design has been delegated)

Timothy L. Fret

Signature of Architect or Structural Engineer

6/6/18

date

IDENTIFICATION STAMP
 DIV OF THE STATE ARCHITECT
 APP. # 01-117586

AC N/A F/L/S N/A SS

DATE

DSA-103 Issued 9/1/2017



List of Required Structural Tests & Special Inspections - 2016 CBC

INCREMENT # 21-H1
 DSA File No.: 01-117586
 Application No.: 6/8/2018
 Date Submitted: Revised:
 Revised:

Appendix: Work Exempt from DSA Requirements for Special Inspection or Structural Testing

Exempt items given in IR A-22 or the 2016 CBC (including DSA amendments) and those items identified below with an "X" by the design professional are NOT subject to DSA requirements for the structural tests or special inspections noted. Items marked as exempt shall be identified by either: 1) listing specific details/sheets noted in the spaces provided below OR 2) on the approved construction documents. The project inspector shall verify all construction complies with the approved construction documents.

Exempt by Design Prof.

Soils:	
1. Deep foundations acting as a cantilever footing designed based on minimum allowable pressures per 2016 CBC Table 1806A.2 and having no geotechnical report for the following types of structures: free standing sign, scrolling message sign, scoreboard, covered walkway or shade structure with dead load less than 5 psf and other light-weight structures of which the apex is less than 8' above the highest adjacent grade.	X
2. Shallow foundations meeting the exception item #1 criteria specified in 2016 CBC Section 1803A.2.	X
(Optional) List details for applicable exempt items:	
Concrete/Masonry:	
1. Post-installed anchors for the following: 1) exempt non-structural components (e.g., mechanical, electrical, plumbing equipment - see item 7 for "Welding") given in CBC Section 1616A.1.18 (which replaces ASCE 7-10, Section 13.1.4) or 2) interior nonstructural wall partitions meeting criteria listed in exempt item 3 for "Welding."	X
2. Concrete batch plant inspection is not required for items given in CBC Section 1705A.3.3.2 subject to the requirements and limitations in that section.	X
3. Masonry retaining walls less than 4'-0" above the top of foundation not supporting a surcharge and free standing nonbearing non-shear masonry walls up to 6'-0" above adjacent grade do not require grout, mortar or masonry core testing or DSA special inspection.	X

Exempt by Design Prof.

Welding:	
1. Solid-clad and open-mesh gates with maximum leaf span or rolling section for rolling gates of 10' and apex height less than 8'-0" above lowest adjacent grade. When located above circulation or occupied space below, these gates are not located within 1.5x gate/fence height (max 8'-0") to the edge of floor or roof.	X
2. Handrails, guardrails, and modular or relocatable ramps associated with walking surfaces less than 30" above adjacent grade (excluding post base connections per the "Exception" language in Section 1705A.2.1); fillet welds cannot be ground flush.	X
3. Non-structural interior cold-formed steel framing spanning less than 15'-0", such as in interior partitions, interior soffits, etc. supporting only self weight and light-weight finishes or adhered tile, masonry, stone, or terra cotta veneer no more than 5/8" thickness and apex less than 20'-0" in height and not over an exit way. Maximum tributary load to a member shall not exceed the equivalent of that occurring from a 10'x10' opening in a 15' tall wall for a header or king stud.	X
4. Manufactured support frames and curbs using hot rolled or cold-formed steel (i.e., light gauge) for mechanical, electrical, or plumbing equipment weighing less than 2000# (equipment only) (connections of such frames to superstructure elements using welding will require special inspection as noted in selected item(s) for section 19, 19.1 and/or 19.2 of listing above).	X
5. Manufactured components (e.g., Tolco, B-Line, Afcon, etc.) for mechanical, electrical, or plumbing hanger support and bracing (connections of such components to superstructure elements using welding will require special inspection as noted in selected item(s) for section 19, 19.1 and/or 19.2 of listing above).	X
6. TV Brackets, projector mounts with a valid listing (see DSA IR A-5) and recreational equipment (e.g., playground structures, basketball backstops, etc.) (connections of such elements to superstructure elements using welding will require special inspection as noted in selected item(s) for section 19, 19.1 and/or 19.2 of listing above).	X
7. Any support for exempt non-structural components given in CBC Section 1616A.1.18 (which replaces ASCE 7-10, Section 13.1.4) meeting the following: 1) when supported on a floor/roof, <400# and resulting composite center of mass (including component's center of mass) <= 4' above supporting floor/roof, 2) when hung from a wall or rooftop, <20# for discrete units or <5 plf for distributed systems.	X

DSA-103

(Issued 9-1-17)

+ In the CODE REFERENCE AND NOTES column indicates DSA-SS/CC sections that may be used by community colleges, per 2016 CBC Sec. 1.9.2.2.

DSA-103 Issued 9/1/2017



List of Required Structural Tests & Special Inspections - 2016 CBC

INCREMENT #	DSA File No.:	21-H1
	Application No.:	01-117586
Date Submitted:	6/8/2018	Revised:
		Revised:

(Optional) List details for applicable exempt items:

☒	4. Epoxy shear dowels in site flatwork.
(Optional) List details for applicable exempt items:	

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions;
- C. Site Standards; and
- D. Construction Waste Management and Disposal.

1.02 TEMPORARY UTILITIES

A. Electric Power and Lighting:

- (1) Contractor will pay for power during the course of the Work. To the extent power is available in the building(s) or on the Site, Contractor may use the District's existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver that power service from its existing location in the building(s) or on the Site to point of intended use.
- (2) Contractor shall verify characteristics of power available in building(s) or on the Site. Contractor shall take all actions required to make modifications where power of higher voltage or different phases of current are required. Contractor shall be fully responsible for providing that service and shall pay all costs required therefor.
- (3) Contractor shall furnish, wire for, install, and maintain temporary electrical lights wherever it is necessary to provide illumination for the proper performance and/or observation of the Work: a minimum of 20 foot-candles for rough work and 50 foot-candles for finish work.
- (4) Contractor shall be responsible for maintaining existing lighting levels in the project vicinity should temporary outages or service interruptions occur.

B. Heat and Ventilation:

- (1) Contractor shall provide temporary heat to maintain environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation and curing of materials, and to protect materials and finishes from damage due to improper temperature and humidity conditions. Portable heaters shall be standard units complete with controls.
- (2) Contractor shall provide forced ventilation and dehumidification, as required, of enclosed areas for proper installation and curing of materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors, and gases.

- (3) Contractor shall pay the costs of installation, maintenance, operation, and removal of temporary heat and ventilation, including costs for fuel consumed, required for the performance of the Work.

C. Water:

- (1) Contractor shall pay for water used during the course of the Work. Contractor shall coordinate and pay for installation or use of water meter in compliance with local water agency requirements. To the extent water is then available in the building(s) or on the Site, Contractor may use the District's existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver such utility service from its existing location in the building(s), on the Site, or other location approved by the local water agency, to point of intended use.
- (2) Contractor shall use backflow preventers on water lines at point of connection to District's water supply. Backflow preventers shall comply with requirements of Uniform Plumbing Code.
- (3) Contractor shall make potable water available for human consumption.

D. Sanitary Facilities:

- (1) Contractor shall provide sanitary temporary facilities in no fewer numbers than required by law and such additional facilities as may be directed by the Inspector for the use of all workers. The facilities shall be maintained in a sanitary condition at all times and shall be left at the Site until removal is directed by the Inspector or Contractor completes all other work at the Site.
- (2) Use of toilet facilities in the Work under construction shall not be permitted except by consent of the Inspector and the District.

E. Telephone Service:

- (1) Contractor shall arrange with local telephone service company for telephone service as required for the performance of the Work. Contractor shall, at a minimum, provide in its field office one line for telephone and one line for fax machine.
- (2) Contractor shall pay the costs for telephone and fax lines installation, maintenance, service, and removal.

F. Fire Protection:

- (1) Contractor shall provide and maintain fire extinguishers and other equipment for fire protection. Such equipment shall be designated for use for fire protection only and shall comply with all requirements of the California Fire, State Fire Marshall and/or its designee.
- (2) Where on-site welding and burning of steel is unavoidable, Contractor shall provide protection for adjacent surfaces.

G. Trash Removal:

- (1) Contractor shall provide trash removal on a timely basis as needed and within approved hours of construction[A1]. Under no circumstance shall Contractor use District trash service.

H. Field Office:

- (1) If Contractor chooses to provide a field office, it shall be an acceptable construction trailer that is well-lit and ventilated. The construction trailer shall be equipped with shelves, desks, filing cabinet, chairs, and such other items of equipment needed. Trailer and equipment are the property of the Contractor and must be removed from the Site upon completion of the Work. Contractor may use designated approved laydown area at existing basketball courts (see attached diagram) for an office area[A2].
- (2) Contractor shall provide any additional electric lighting and power required for the trailer. Contractor shall make adequate provisions for heating and cooling as required.

I. Temporary Facilities[A3]:

- (1) Power is available from existing buildings.
- (2) Water is available from existing buildings or water fountain.

1.03 CONSTRUCTION AIDS

A. Plant and Equipment:

- (1) Contractor shall furnish, operate, and maintain a complete plant for fabricating, handling, conveying, installing, and erecting materials and equipment; and for conveyances for transporting workers. Include elevators, hoists, debris chutes, and other equipment, tools, and appliances necessary for performance of the Work.
- (2) Contractor shall maintain plant and equipment in safe and efficient operating condition. Damages due to defective plant and equipment, and uses made thereof, shall be repaired by Contractor at no expense to the District.

B. None of the District's tools and equipment shall be used by Contractor for the performance of the Work.

1.04 BARRIERS AND ENCLOSURES

A. Contractor shall obtain the District's written permission for locations and types of temporary barriers and enclosures, including fire-rated materials proposed for use, prior to their installation.

B. Contractor shall provide and maintain temporary enclosures to prevent public entry and to protect persons using other buildings and portions of the Site and/or Premises, the public, and workers. Contractor shall also protect the Work and existing facilities from the elements, and adjacent construction and improvements, persons, and trees and plants from damage and injury from demolition and construction operations.

C. Contractor shall provide site access to existing facilities for persons using other buildings and portions of the Site, the public, and for deliveries and other services and activities.

D. Tree and Plant Protection:

- (1) Contractor shall preserve and protect existing trees and plants on the Premises that are not designated or required to be removed, and those adjacent to the Premises.

- (2) Contractor shall provide barriers to a minimum height of 4'-0" around drip line of each tree and plant, around each group of trees and plants, as applicable, in the proximity of demolition and construction operations, or as denoted on the Plans.
- (3) Contractor shall not park trucks, store materials, perform Work or cross over landscaped areas. Contractor shall not dispose of paint thinners, water from cleaning, plastering or concrete operations, or other deleterious materials in landscaped areas, storm drain systems, or sewers. Plant materials damaged as a result of the performance of the Work shall, at the option of the District and at Contractor's expense, either be replaced with new plant materials equal in size to those damaged or by payment of an amount representing the value of the damaged materials as determined by the District.
- (4) Contractor shall remove soil that has been contaminated during the performance of the Work by oil, solvents, and other materials which could be harmful to trees and plants, and replace with good soil, at Contractor's expense.
- (5) Excavation around Trees:
 - (a) Excavation within drip lines of trees shall be done only where absolutely necessary and with written permission from the District.
 - (b) Where trenching for utilities is required within drip lines, tunneling under and around roots shall be by hand digging and shall be approved by the District. Main lateral roots and taproots shall not be cut. All roots 2 inches in diameter and larger shall be tunneled under and heavily wrapped with wet burlap so as to prevent scarring or excessive drying. Smaller roots that interfere with installation of new work may be cut with prior approval by the District. Roots must first be cut with a Vermeer, or equivalent, root cutter prior to any trenching.
 - (c) Where excavation for new construction is required within drip line of trees, hand excavation shall be employed to minimize damage to root system. Roots shall be relocated in backfill areas wherever possible. If encountered immediately adjacent to location of new construction, roots shall be cut approximately 6 inches back from new construction.
 - (d) Approved excavations shall be carefully backfilled with the excavated materials approved for backfilling. Backfill shall conform to adjacent grades without dips, sunken areas, humps, or other surface irregularities. Do not use mechanical equipment to compact backfill. Tamp carefully using hand tools, refilling and tamping until Final Acceptance as necessary to offset settlement.
 - (e) Exposed roots shall not be allowed to dry out before permanent backfill is placed. Temporary earth cover shall be provided, or roots shall be wrapped with four layers of wet, untreated burlap and temporarily supported and protected from damage until permanently relocated and covered with backfill.
 - (f) Accidentally broken roots should be sawed cleanly 3 inches behind ragged end.

1.05 SECURITY

The Contractor shall be responsible for project security for materials, tools, equipment, supplies, and completed and partially completed Work.

1.06 TEMPORARY CONTROLS

A. Noise Control:

- (1) Contractor acknowledges that adjacent facilities may remain in operation during all or a portion of the Work period, and it shall take all reasonable precautions to minimize noise as required by applicable laws and the Contract Documents.
- (2) Notice of proposed noisy operations, including without limitation, operation of pneumatic demolition tools, concrete saws, and other equipment, shall be submitted to the District a minimum of forty-eight (48) hours in advance of their performance.

B. Noise and Vibration:

- (1) Equipment and impact tools shall have intake and exhaust mufflers.
- (2) Contractor shall cooperate with District to minimize and/or cease the use of noisy and vibratory equipment if that equipment becomes objectionable by its longevity.

C. Dust and Dirt:

- (1) Contractor shall conduct demolition and construction operations to minimize the generation of dust and dirt, and prevent dust and dirt from interfering with the progress of the Work and from accumulating in the Work and adjacent areas including, without limitation, occupied facilities.
- (2) Contractor shall periodically water exterior demolition and construction areas to minimize the generation of dust and dirt.
- (3) Contractor shall ensure that all hauling equipment and trucks carrying loads of soil and debris shall have their loads sprayed with water or covered with tarpaulins, and as otherwise required by local and state ordinance.
- (4) Contractor shall prevent dust and dirt from accumulating on walks, roadways, parking areas, and planting, and from washing into sewer and storm drain lines.

D. Water:

- (1) Contractor shall not permit surface and subsurface water, and other liquids, to accumulate in or about the vicinity of the Premises. Should accumulation develop, Contractor shall control the water or other liquid, and suitably dispose of it by means of temporary pumps, piping, drainage lines, troughs, ditches, dams, or other methods.

E. Pollution:

- (1) No burning of refuse, debris, or other materials shall be permitted on or in the vicinity of the Premises.
- (2) Contractor shall comply with applicable regulatory requirements and anti-pollution ordinances during the conduct of the Work including, without limitation, demolition, construction, and disposal operations.

F. Lighting:

- (1) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

1.07 JOB SIGN(S)

A. General:

- (1) Contractor shall provide and maintain a Project identification sign with the design, text, and colors designated by the District and/or the Design Professional; locate sign as approved by the District.
- (2) Signs other than the specified Project sign and or signs required by law, for safety, or for egress, shall not be permitted, unless otherwise approved in advance by the District.

B. Materials:

- (1) Structure and Framing: Structurally sound, new or used wood or metal; wood shall be nominal 3/4-inch exterior grade plywood.
- (2) Sign Surface: Minimum 3/4-inch exterior grade plywood.
- (3) Rough Hardware: Galvanized.
- (4) Paint: Exterior quality, of type and colors selected by the District and/or the Design Professional.

C. Fabrication:

- (1) Contractor shall fabricate to provide smooth, even surface for painting.
- (2) Size: 4'-0" x 8'-0", unless otherwise indicated.
- (3) Contractor shall paint exposed surfaces of supports, framing, and surface material with exterior grade paint: one coat of primer and one coat of finish paint.
- (4) Text and Graphics: As indicated.

1.08 PUBLICITY RELEASES

- A. Contractor shall not release any information, story, photograph, plan, or drawing relating information about the Project to anyone, including press and other public communications medium, including, without limitation, on website(s) without the written permission of the District.

PART 2 – PRODUCTS Not used.

PART 3 – EXECUTION Not used.

END OF SECTION

06/06/18

SECTION 01 52 13

FIELD OFFICES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions; and
- C. Temporary Facilities and Controls.

1.02 SECTION INCLUDES

- A. Requirements for Field Offices and Field Office Trailers.

1.03 SUMMARY

- A. General: Contractor shall provide District's Field Office Trailer and contents, for District's use exclusively, during the term of the Contract.
- B. Property: Trailer, furniture, furnishings, equipment, and the like, supplied by the Contractor with the Office Trailer shall remain the property of the Contractor; District property items installed, delivered, and the like by District within the Office Trailer will remain District's property.
- C. Modifications: District reserves the right to modify the trailer or contents, or both, as may be deemed proper by District.
- D. Condition: Trailer and contents shall be clean, neat, substantially finished, in good, proper, and safe condition for use, operation, and the like; the trailer and contents shall not be required to be new.
- E. Installation Timing: Provide safe, fully furnished, functional, proper, complete, and finished trailer properly ready for entire use, within fourteen (14) calendar days of District's notification of the issuance of Notice to Proceed.

1.04 SUBMITTALS

- A. General: Submit submittals to District in quantity, format, type, and the like, as specified herein.
- B. Office Trailer Data: One (1) copy of manufacturer's descriptive data, technical descriptions, regulatory compliance, industry standards, installation, removal, and maintenance instructions.
- C. Equipment Data: Two (2) copies of manufacturer data for each type of equipment, if directed by District.
- D. Furniture and Furnishings Data: Two (2) copies of manufacturer data for each type of equipment, if directed by District.

- E. Plans: One (1) reproducible copy of appropriately scaled plans of trailer layout. Plans shall include, but not be limited to: lighting; furniture; equipment; telephone and electrical outlets; and the like.
- F. Product Samples: One (1) complete and entire unit of each type, if directed by District.

1.05 QUALITY ASSURANCE

- A. Standards: In the event that provisions of codes, regulations, safety orders, Contract Documents, referenced manufacturer's specifications, manufacturer's instructions, industry standards, and the like, are in conflict, the more restrictive and higher quality shall govern.
- B. Installer: Installer or Installers engaged by Contractor must have a minimum of five (5) years of documented and properly authenticated successful experience of specialization in the installation of the items or systems, or both, specified herein.
- C. Manufacturer: Contractor shall obtain products from nationally and industry recognized Manufacturer with five (5) years minimum, of immediately recent, continuous, documented and properly authenticated successful experience of specialization in the manufacture of the product specified herein.
- D. State Personnel Training: Provide proper training for maintenance and operations, including emergency procedures, and the like, as directed by District.
- E. Units: Shall be sound and free of defects, and shall not include any damage or defect that will impair the safety, installation, performance, or the durability of the entire Office Trailer and appurtenant systems.

1.06 REGULATORY REQUIREMENTS

- A. General: Work shall be executed in accordance with applicable Codes, Regulations, Statutes, Enactments, Rulings, Laws, each authority having jurisdiction, and including, but not limited to, Regulatory Requirements specified herein.
- B. California Building Standards Code ("CBSC").
- C. California Code of Regulations, Title 25, Chapter 3, Sub Chapter 2, Article 3 ("CCR").
- D. Coach Insignia: Trailer shall display California Commercial Coach Insignia; such insignia shall be deemed to show that the trailer is in accordance with the Construction and Fire Safety requirements of CCR.

PART 2 – PRODUCTS

2.01 FIELD OFFICE TRAILER

- A. General: Provide entire Field Office Trailer of type, function, operation, capacity, size, complete with controls, safety devices, accessories, and the like, for proper and durable installation. Partitions, walls, ceiling, and other interior and exterior surfaces shall be appropriately finished, including, but not limited to, trim, painting, wall base, floor covering, suspended or similar ceiling, and the like; provide systems, components, units, nuts, bolts, screws, anchoring devices, fastening devices, washers, accessories, adhesives, sealants, and other items of type, grade, and class required for the particular use, not identified but required for a complete, weather-tight, appropriately operating, and finished installation.

- B. Manufacturers: General Electric Capital Modular Space; The Space Place, Inc.; or equal.
- C. Program: Provide a wheel-mounted trailer with stairs, landings, platforms, ramps, and the like, in good, proper, safe, clean, and properly finished condition; with proper heavy duty locks, and other proper and effective security at all doors, windows, and the like. Trailer shall be maintained in good, proper, safe, clean, and properly finished condition during the Contract.
- (1) Nominal Trailer Size: Four hundred eighty (480) square feet, minimum.
 - (2) Stairs, Platform: Properly finished stairs, platforms, and ramps.
 - (3) Doors: Two (2), three (3) foot wide exterior doors with locksets; finished ramp, steps, and entry platform at each exterior door.
 - (4) Keys: Submit five (5) keys for each door, window, furniture unit, and the like. There shall be no other key copies or originals available; each key shall be identified for District; and shall be labeled, or tagged or both, as directed by District.
 - (5) HVAC: None. [A1]
 - (6) Lighting: Sixty-five (65) foot-candles illumination minimum at any point, at thirty (30) inches above finished floor throughout from fluorescent light source, exclusively, or as directed by District.
 - (7) Electrical Outlets: One (1) duplex outlet evenly spaced every twelve (12) linear horizontal feet of wall face, and electrical service ready for use.
 - (8) Telephones and Telephone Outlets: Two (2) telephone lines wired, connected to telephone utility service, and ready for use, and two (2) telephone instruments, each with two (2)-line capability, speed dial and hands-free feature. Locate each outlet as directed by District.
 - (9) Voicemail Messaging System or Answering Machine: One (1) unit, two (2)-line; digital.

2.02 FIELD OFFICE TRAILER ITEMS

- A. General: Provide the Field Office Trailer with the following arranged into two (2) workstations:
- (1) Desks: Two (2) desks: thirty-six (36) inches by sixty (60) inches; steel, laminated plastic top; locking, one (1) or two (2) file drawers single pedestal; steel; provide five (5) keys to District.
 - (2) Tables: Two (2) tables; thirty-six (36) inches by sixty (60) inches; twenty-nine (29) inches high; steel, laminated plastic top tables; one (1) at each desk.
 - (3) Chairs: Two (2) chairs: swivel; steel; with seat cushion and arms; one (1) at each desk.
 - (4) Waste Baskets: Two (2) waste baskets, one at each desk.
- B. Furniture and Equipment: Provide in the space located to effect efficient and logical use.

- (1) File cabinet: One (1); four (4) drawer; lateral; steel locking.
- (2) Plan Table: One (1) plan table: thirty-six (36) inches deep by seventy-two (72) inches wide by forty-two (42) inches high; adjustable; wood or steel; with lockable plan and pencil drawers.
- (3) Drafting Stool: One (1) drafting stool; swiveling; steel; padded; adjustable; with footrest and casters.
- (4) Bookshelf: One (1) bookshelf: thirty-six (36) inches deep by seventy-two (72) inches wide by forty-two (42) inches high; adjustable; wood or steel; with lockable plan and pencil drawer.
- (5) Plan Rack: One (1) wheel mounted plan rack.
- (6) Waste Baskets: One (1) large waste basket.
- (7) Coat/Hat Hanger: Wall mounted with minimum capacity for four (4) garments and ten (10) hats.
- (8) Document Management System: Shall include an integrated high-volume printer, copier, and facsimile machine, including stand, base, and storage cabinet; and shall include the following features:
 - (a) Type: Laser, dry electrostatic transfer, plain paper, digital, multi-function imaging system.
 - (b) Network: Ethernet or Token Ring network ready, Plug-and-Play.
 - (c) Print, send/receive facsimile from any connected workstation.
 - (d) Resolution: Six hundred (600) dots per inch by six hundred (600) dots per inch, minimum.
 - (e) Print Speed: Twenty (20) pages per minute, minimum.
 - (f) Copies: Twenty (20) copies per minute, minimum.
 - (g) Document Handler: Forty (40) sheet, minimum
 - (h) Collator: Forty (40) bin, minimum, with stapling.
 - (i) Duplexing: Capable.
 - (j) Paper Size: Capable of handling paper sizes to eleven (11) inches by seventeen (17) inches.
 - (k) Paper Cassettes: One (1) each for eight and one half (8.5) inches by eleven (11) inches, eight and one half (8.5) inches by fourteen (14) inches, and eleven (11) inches by seventeen (17) inches paper sizes; minimum two hundred fifty (250) sheets per cassette.
 - (l) Reduction/Enlargement: Capable of reduction to twenty-five percent (25%) and enlargement to two hundred percent (200%).
 - (m) Facsimile Electronic Storage: Capable of storing minimum of fifty (50) speed dial numbers, group faxing and broadcast faxing.

- (n) Facsimile Scanning: Capable of scanning into memory a minimum of one hundred (100) pages with maximum scan time of three (3) seconds per page.
 - (o) Halftone: Sixty-four (64) levels.
 - (p) Redial: Automatic and Manual.
- (9) Maintenance: Contractor shall purchase service agreements for each unit of equipment for the duration of the project plus two (2) months, and shall maintain all equipment in proper working condition. Service agreements shall include provision for replacement of toner cartridges and other items required to effect proper unit use. Service agreements shall also provide for:
- (a) Unlimited Service Calls.
 - (b) Same Day Response.
 - (c) All parts, labor, preventative maintenance and mileage.
 - (d) All chemicals, such as toner, fixing agent, and the like.
 - (e) System training and setup.
- (10) Portable Toilets: Two (2); each shall include a urinal; each unit shall be a properly enclosed chemical unit conforming to ANSI Z4.3.
- (a) Location: As directed by District.
 - (b) Maintenance: Maintain each unit and surrounding areas in a clean, hygienic and orderly manner, at all time. Empty, clean, and sanitize each unit each day at a location and time as directed by District.
 - (c) Removal: Relocate, or remove from the site, each Portable Toilet. Upon such directive by District, the Contractor shall forthwith relocate or remove each Portable Toilet and submit the affected areas to a condition which existed prior to the installation of each Portable Toilet, within three (3) calendar days, or as directed by District in writing, at no cost to District.

2.03 UTILITY AND SERVICES

- A. Telephone Service: Contractor shall provide and interface the entire telephone service, and shall properly and timely pay for telephone service for District's non-long-distance use.
- B. Electrical Service: Provide all proper connections and continuously pay for service for the duration of the Work.

2.04 FINISHES

- A. General: Manufacturer standard finish system over surfaces properly cleaned, pretreated, and prepared to obtain proper bond; all visible surfaces shall be coated.
- B. Finish: Color as selected by District from manufacturer standard palette.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. General: Properly prepare area and affected items to receive the Work. Set Work accurately in location, alignment, and elevation; rigidly, securely, and firmly anchor to appropriate structure; install plumb, straight, square, level, true, without racking, rigidly anchored to proper solid blocking, substrate, and the like; provide appropriate type and quantity of reinforcements, fasteners, adhesives, self-adhesive and other tapes; lubricants, coatings, accessories, and the like, as required for a complete, structurally rigid, stable, sound, and appropriately finished installation, in accordance with manufacturer's published instructions, and as indicated. The more restrictive and higher quality requirement shall govern. Moving parts shall be properly secured, without binding, looseness, noise, and the like.
- B. Installation: Install in accordance with 25 CCR 3.2.3 and as directed by District; jack up trailer and level both ways; mount on proper concrete piers with all load off wheels; provide required tie down and accessories per Section 4368 of referenced CCR, and as directed by District.
- C. Rejected Work: Work, materials, unit, items, systems, and the like, not accepted by District shall be deemed rejected, and shall forthwith be removed and replaced with proper and new Work, materials, unit, items, systems, and the like at no cost to District.
- D. Standard: Comply with manufacturer's published instructions, or with instructions as shown or indicated; the more restrictive and higher quality requirement shall govern.
- E. Location: As directed by District.
- F. Fire Resistance: Construct and install in accordance with UL requirements.
- G. Maintenance: Contractor shall maintain trailer and adjacent areas in a safe, clean and hygienic condition throughout the duration of the Work, and as directed by District. Properly repair or replace furniture or other items, as directed by District. Properly remove unsafe, damaged, or broken furniture, or similar items, and replace with safe and proper items. Contractor shall pay cost of all services, repair, and maintenance, or replacement of each item.
- H. Janitorial Service: Provide professional janitorial services, including, but not limited to, trash, waste paper baskets, fill paper dispensers; clean and dust all furniture, files, and the like; sweep and mop resilient and similar flooring; and vacuum carpeting and similar flooring.
 - (1) Frequency: Two (2) times per week, minimum.
- I. Removal: Properly remove the Office Trailer and contents from the Site upon completion of the Contract, or as directed by District in writing. Forthwith properly patch and repair affected areas; replace damaged items with new items. Carefully and properly inventory, clean, pack, store, and protect District property; submit District property to District at a date, time and location as directed by District.

END OF SECTION

06/06/18

SECTION 01 60 00

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Purchase of Materials and Equipment;
- B. Special Conditions;
- C. Imported Materials Certification.

1.02 MATERIAL AND EQUIPMENT

- A. Only items approved by the District and/or Architect shall be used.
- B. Contractor shall submit lists of products and other product information in accordance with the Contract Documents, including, without limitation, the provisions regarding the submittals.

1.03 MATERIAL AND EQUIPMENT COLORS

- A. The District and/or Architect will provide a schedule of colors.
- B. No individual color selections will be made until after approval of all pertinent materials and equipment and after receipt of appropriate samples in accordance with the Contract Documents, including, without limitation, the provisions regarding the submittals.
- C. Contractor shall request priority in writing for any item requiring advance ordering to maintain the approved Construction Schedule.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Contractor shall deliver manufactured materials in original packages, containers, or bundles (with seals unbroken), bearing name or identification mark of manufacturer.
- B. Contractor shall deliver fabrications in as large assemblies as practicable; where specified as shop-primed or shop-finished, package or crate as required to preserve such priming or finish intact and free from abrasion.
- C. Contractor shall store materials in such a manner as necessary to properly protect them from damage. Materials or equipment damaged by handling, weather, dirt, or from any other cause will not be accepted.
- D. Materials are not acceptable that have been warehoused for long periods of time, stored or transported in improper environment, improperly packaged, inadequately labeled, poorly protected, excessively shipped, deviated from normal distribution pattern, or reassembled.

- E. Contractor shall store material so as to cause no obstructions of sidewalks, roadways, access to the Site or buildings, and underground services. Contractor shall protect material and equipment furnished under Contract.
- F. Contractor may store materials on Site with prior written approval by the District, all material shall remain under Contractor's control and Contractor shall remain liable for any damage to the materials. Should the Project Site not have storage area available, the Contractor shall provide for off-site storage at a bonded warehouse and with appropriate insurance coverage at no cost to District.
- G. When any room in Project is used as a shop or storeroom, the Contractor shall be responsible for any repairs, patching, or cleaning necessary due to that use. Location of storage space shall be subject to prior written approval by District.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers listed in various sections of Contract Documents are names of those manufacturers that are believed to be capable of supplying one or more of items specified therein.
- B. The listing of a manufacturer does not imply that every product of that manufacturer is acceptable as meeting the requirements of the Contract Documents.

2.02 FACILITIES AND EQUIPMENT

- A. Contractor shall provide, install, maintain, and operate a complete and adequate facility for handling, the execution, disposal, and distribution of material and equipment as required for proper and timely performance of Work connected with Contract.

2.03 MATERIAL REFERENCE STANDARDS

- A. Where material is specified solely by reference to "standard specifications" and if requested by District, Contractor shall submit for review data on actual material proposed to be incorporated into Work of Contract listing name and address of vendor, manufacturer, or producer, and trade or brand names of those materials, and data substantiating compliance with standard specifications.

PART 3 - EXECUTION

3.01 WORKMANSHIP

- A. Where not more specifically described in any other Contract Documents, workmanship shall conform to methods and operations of best standards and accepted practices of trade or trades involved and shall include items of fabrication, construction, or installation regularly furnished or required for completion (including finish and for successful operation, as intended).
- B. Work shall be executed by tradespersons skilled in their respective lines of Work. When completed, parts shall have been durably and substantially built and present a neat appearance.

3.02 COORDINATION

- A. Contractor shall coordinate installation of Work so as to not interfere with installation of others. Adjustment or rework because of Contractor's failure to coordinate will be at no additional cost to District.

- B. Contractor shall examine in-place work for readiness, completeness, fitness to be concealed or to receive other work, and in compliance with Contract Documents. Concealing or covering Work constitutes acceptance of additional cost which will result should in-place Work be found unsuitable for receiving other Work or otherwise deviating from the requirements of the Contract Documents.

3.03 COMPLETENESS

- A. Contractor shall provide all portions of the Work, unless clearly stated otherwise, installed complete and operational with all elements, accessories, anchorages, utility connections, etc., in manner to assure well-balanced performance, in accordance with manufacturer's recommendations and by Contract Documents. For example, electric water coolers require water, electricity, and drain services; roof drains require drain system; sinks fit within countertop, etc. Terms such as "installed complete," "operable condition," "for use intended," "connected to all utilities," "terminate with proper cap," "adequately anchored," "patch and refinish," "to match similar," should be assumed to apply in all cases, except where completeness of functional or operable condition is specifically stated as not required.

3.04 APPROVED INSTALLER OR APPLICATOR

- A. Installation by a manufacturer's approved installer or applicator is an understood part of Specifications and only approved installer or applicator is to provide on-site Work where specified manufacturer has on-going program of approving (i.e. certifying, bonding, re-warranting) installers or applicators. Newly established relationships between a manufacturer and an installer or applicator who does not have other approved applicator work in progress or completed is not approved for this Project.

3.05 MANUFACTURER'S RECOMMENDATIONS

- A. All installations shall be in accordance with manufacturer's published recommendations and specific written directions of manufacturer's representative. Should Contract Documents differ from recommendations of manufacturer or directions of his representative, Contractor shall analyze differences, make recommendations to the District and the Architect in writing, and shall not proceed until interpretation or clarification has been issued by the District and/or the Architect.

END OF SECTION

06/06/18

SECTION 01 64 00

OWNER-FURNISHED PRODUCTS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions; and
- C. Materials and Equipment.

1.02 SECTION INCLUDES

- A. Requirements for the following:
 - (1) Installing Owner-furnished materials and equipment.
 - (2) Providing necessary utilities, connections and rough-ins.

1.03 DEFINITIONS

- A. Owner: District, who is providing/furnishing materials and equipment.
- B. Installing Contactor or Installer/Contractor: Contractor, who is installing the materials and equipment furnished by the Owner.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Receive, store and handle products in accordance with the manufacturer's instructions.
- B. Protect equipment items as required to prevent damage during storage and construction.

PART 2 – PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

- A. Installer Contractor's Responsibilities:
 - (1) Verify mounting and utility requirements for Owner-furnished materials and equipment items.
 - (2) Provide mounting and utility rough in for all items where required.
 - (a) Rough in locations, sizes, capacities, and similar type items shall be as indicated and required by product manufacturer.
- B. Owner and Installer Contractor(s) Responsibilities:

- (1) Owner-Furnished/Contractor Installed ("OFCI"): Furnished by the Owner; installed by the Installer Contractor.
- (a) General: Owner and Installer Contractor(s) will coordinate deliveries of materials and equipment to coincide with the construction schedule.
 - (b) Owner will furnish specified materials and equipment delivered to the site. Owner/vendor's representative shall be present on Site at the time of delivery to comply with the contract requirements and Specifications Section 01 60 00, Materials and Equipment, Article 1.04.
 - (c) The Owner furnishing specified materials and equipment is responsible to provide manufacturer guarantees as required by the Contract to the Installer Contractor.
 - (d) The Installer Contractor shall:
 - 1) Review, verify and accept the approved manufacturer's submittal/Shop Drawings for all materials and equipment required to be installed by the Installer Contractor and furnished by the Owner. Any discrepancies, including but not limited to possible space conflicts, should be brought to the attention of the Project Manager and/or Program Manager, if applicable.
 - 2) Coordinate timely delivery. Installer Contractor shall receive materials and equipment at Site when delivered and give written receipt at time of delivery, noting visible defects or omissions; if such declaration is not given, the Installer Contractor shall assume responsibility for such defects and omissions.
 - 3) Store materials and equipment until ready for installation and protect from loss and damage. Installer Contractor is responsible for providing adequate storage space.
 - 4) Coordinate with other bid package contractors and field measurement to ensure complete installation.
 - 5) Uncrate, assemble, and set in place.
 - 6) Provide adequate supports.
 - 7) Install materials and equipment in accordance with manufacturer's recommendations, instructions, and Shop Drawings, supply labor and material required, and make mechanical, plumbing, and electrical connections required to operate equipment.
 - 8) Be certified by equipment manufacturer for installation of the specific equipment supplied by the Owner.
 - 9) Provide anchorage and/or bracing as required for seismic restraint per Title 24, UBC Standard 27-11 and all other applicable codes.

- 10) Provide the contract-required warranty and guarantee for all work, materials and equipment, and installation upon its completion and acceptance by the District. Guarantee includes all costs associated with the removal, shipping to and from the Site, and re-installation of any equipment found to be defective.

C. Compatibility with Space and Service Requirements:

- (1) Equipment items shall be compatible with space limitations indicated and as shown on the Contract Documents and specified in other sections of the Specifications.
- (2) Modifications to equipment items required to conform to space limitations specified for rough in shall not cause additional cost to the District.

D. Manufacturer's printed descriptions, specifications, and instructions shall govern the Work unless specifically indicated or specified otherwise.

2.02 FURNISHED MATERIALS AND EQUIPMENT

A. All furnished materials and equipment are indicated or scheduled on the Contract Documents.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install equipment items in accordance with the manufacturer's instructions.
- B. Set equipment items securely in place, rigidly or flexibly mounted in accordance with manufacturers' directions.
- C. Make electrical and mechanical connections as indicated and required.
- D. Touch-up and restore damaged or defaced finishes to the District's satisfaction.

3.02 CLEANING AND PROTECTION

- A. Repair or replace items not acceptable to the Architect or District.
- B. Upon completion of installation, clean equipment items in accordance with manufacturer's recommendations, and protect from damage until final acceptance of the Work by the District.

END OF SECTION

06/06/18

SECTION 01 66 00

PRODUCT DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Site Access, Conditions and Requirements;
- B. Special Conditions.

1.02 PRODUCTS

- A. Products are as defined in the General Conditions.
- B. Contractor shall not use and/or reuse materials and/or equipment removed from existing Premises, except as specifically permitted by the Contract Documents.
- C. Contractor shall provide interchangeable components of the same manufacturer, for similar components.

1.03 TRANSPORTATION AND HANDLING

- A. Contractor shall transport and handle Products in accordance with manufacturer's instructions.
- B. Contractor shall promptly inspect shipments to confirm that Products comply with requirements, quantities are correct, and products are undamaged.
- C. Contractor shall provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.04 STORAGE AND PROTECTION

- A. Contractor shall store and protect Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Contractor shall store sensitive products in weather-tight, climate controlled enclosures.
- B. For exterior storage of fabricated Products, Contractor shall place on sloped supports, above ground.
- C. Contractor shall provide off-site storage and protection when Site does not permit on-site storage or protection.
- D. Contractor shall cover products subject to deterioration with impervious sheet covering and provide ventilation to avoid condensation.
- E. Contractor shall store loose granular materials on solid flat surfaces in a well-drained area and prevent mixing with foreign matter.

- F. Contractor shall provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
- G. Contractor shall arrange storage of Products to permit access for inspection and periodically inspect to assure Products are undamaged and are maintained under specified conditions.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF SECTION

06/06/18

SECTION 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Site Investigation, and Soils Investigation Report;
- B. Special Conditions;
- C. Site-Visit Certification.

1.02 REQUIREMENTS INCLUDED

- A. Contractor shall provide and pay for field engineering services by a California-registered engineer, required for the project, including, without limitations:
 - (1) Survey work required in execution of the Project.
 - (2) Civil or other professional engineering services specified, or required to execute Contractor's construction methods.

1.03 QUALIFICATIONS OF SURVEYOR OR ENGINEERS

- A. Contractor shall only use a qualified licensed engineer or registered land surveyor, to whom District makes no objection.

1.04 SURVEY REFERENCE POINTS

- A. Existing basic horizontal and vertical control points for the Project are those designated on the Drawings.
- B. Contractor shall locate and protect control points prior to starting Site Work and preserve all permanent reference points during construction. In addition Contractor shall:
 - (1) Make no changes or relocation without prior written notice to District and Architect.
 - (2) Report to District and Architect when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
 - (3) Require surveyor to replace Project control points based on original survey control that may be lost or destroyed.

1.05 RECORDS

- A. Contractor shall maintain a complete, accurate log of all control and survey work as it progresses.

1.06 SUBMITTALS

- A. Contractor shall submit name and address of Surveyor and Professional Engineer to District and Architect prior to its/their work on the Project.
- B. On request of District and Architect, Contractor shall submit documentation to verify accuracy of field engineering work, at no additional cost to the District.
- C. Contractor shall submit a certificate signed by registered engineer or surveyor certifying that elevations and locations of improvements are in conformance or nonconformance with Contract Documents.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION

3.01 COMPLIANCE WITH LAWS

- A. Contractor is responsible for meeting all applicable codes, OSHA, safety and shoring requirements.

3.02 NONCONFORMING WORK

- A. Contractor is responsible for any re-surveying required by correction of nonconforming work.

END OF SECTION

06/06/18

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Inspector, Inspections, and Tests, Integration of Work, Nonconforming Work, and Correction of Work, and Uncovering Work;
- B. Special Conditions;
- C. Hazardous Materials Procedures and Requirements;
- D. Hazardous Materials Certification;
- E. Lead-Based Paint Certification;
- F. Imported Materials Certification.

1.02 CUTTING AND PATCHING

- A. Contractor shall be responsible for all cutting, fitting, and patching, including associated excavation and backfill, required to complete the Work or to:
 - (1) Make several parts fit together properly.
 - (2) Uncover portions of Work to provide for installation of ill-timed Work.
 - (3) Remove and replace defective Work.
 - (4) Remove and replace Work not conforming to requirements of Contract Documents.
 - (5) Remove Samples of installed Work as specified for testing.
 - (6) Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.
 - (7) Attaching new materials to existing remodeling areas – including painting (or other finishes) to match existing conditions.
- B. In addition to Contract requirements, upon written instructions from the District, Contractor shall uncover Work to provide for observations of covered Work in accordance with the Contract Documents; remove samples of installed materials for testing as directed by District; and remove Work to provide for alteration of existing Work.
- C. Contractor shall not cut or alter Work, or any part of it, in such a way that endangers or compromises the integrity of the Work, the Project, or work of others.

1.03 SUBMITTALS

- A. Prior to any cutting or alterations that may affect the structural safety of Project, or work of others, and well in advance of executing such cutting or alterations, Contractor shall submit written notice to District pursuant to the applicable notice provisions of the Contract Documents, requesting consent to proceed with the cutting or alteration, including the following:
- (1) The work of the District or other trades.
 - (2) Structural value or integrity of any element of Project.
 - (3) Integrity or effectiveness of weather-exposed or weather-resistant elements or systems.
 - (4) Efficiency, operational life, maintenance or safety of operational elements.
 - (5) Visual qualities of sight-exposed elements.
- B. Contractor's Request shall also include:
- (1) Identification of Project.
 - (2) Description of affected Work.
 - (3) Necessity for cutting, alteration, or excavations.
 - (4) Effects of Work on District, other trades, or structural or weatherproof integrity of Project.
 - (5) Description of proposed Work:
 - (a) Scope of cutting, patching, alteration, or excavation.
 - (b) Trades that will execute Work.
 - (c) Products proposed to be used.
 - (d) Extent of refinishing to be done.
 - (6) Alternates to cutting and patching.
 - (7) Cost proposal, when applicable.
 - (8) The scheduled date the Contractor intends to perform the Work and the duration of time to complete the Work.
 - (9) Written permission of District or other District contractor(s) whose work will be affected.

1.04 QUALITY ASSURANCE

- A. Contractor shall ensure that cutting, fitting, and patching shall achieve security, strength, weather protection, appearance for aesthetic match, efficiency, operational life, maintenance, safety of operational elements, and the continuity of existing fire ratings.

- B. Contractor shall ensure that cutting, fitting, and patching shall successfully duplicate undisturbed adjacent profiles, materials, textures, finishes, colors, and that materials shall match existing construction. Where there is dispute as to whether duplication is successful or has been achieved to a reasonable degree, the District's decision shall be final.

1.05 PAYMENT FOR COSTS

- A. Cost caused by ill-timed or defective Work or Work not conforming to Contract Documents, including costs for additional services of the District, its consultants, including but not limited to the Construction Manager, the Architect, the Project Inspector(s), Engineers, and Agents, will be paid by Contractor and/or deducted from the Contract by the District.
- B. District shall only pay for cost of Work if it is part of the original Contract Price or if a change has been made to the contract in compliance with the provisions of the General Conditions. Cost of Work performed upon instructions from the District, other than defective or nonconforming Work, will be paid by District on approval of written Change Order. Contractor shall provide written cost proposals prior to proceeding with cutting and patching.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Contractor shall provide for replacement and restoration of Work removed. Contractor shall comply with the Contract Documents and with the Industry Standard(s), for the type of Work, and the Specification requirements for each specific product involved. If not specified, Contractor shall first recommend a product of a manufacturer or appropriate trade association for approval by the District.
- B. Materials to be cut and patched include those damaged by the performance of the Work.

PART 3 – EXECUTION

3.01 INSPECTION

- A. Contractor shall inspect existing conditions of the Site and the Work, including elements subject to movement or damage during cutting and patching, excavating and backfilling. After uncovering Work, Contractor shall inspect conditions affecting installation of new products.
- B. Contractor shall report unsatisfactory or questionable conditions in writing to District as indicated in the General Conditions and shall proceed with Work as indicated in the General Conditions by District.

3.02 PREPARATION

- A. Contractor shall provide shoring, bracing and supports as required to maintain structural integrity for all portions of the Project, including all requirements of the Project.
- B. Contractor shall provide devices and methods to protect other portions of Project from damage.
- C. Contractor shall, provide all necessary protection from weather and extremes of temperature and humidity for the Project, including without limitation, any work that

may be exposed by cutting and patching Work. Contractor shall keep excavations free from water.

3.03 ERECTION, INSTALLATION AND APPLICATION

- A. With respect to performance, Contractor shall:
- (1) Execute fitting and adjustment of products to provide finished installation to comply with and match specified tolerances and finishes.
 - (2) Execute cutting and demolition by methods that will prevent damage to other Work, and provide proper surfaces to receive installation of repairs and new Work.
 - (3) Execute cutting, demolition excavating, and backfilling by methods that will prevent damage to other Work and damage from settlement.
- B. Contractor shall employ original installer or fabricator to perform cutting and patching for:
- (1) Weather-exposed surfaces and moisture-resistant elements such as roofing, sheet metal, sealants, waterproofing, and other trades.
 - (2) Sight-exposed finished surfaces.
- C. Contractor shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes as shown or specified in the Contract Documents including, without limitation, the Drawings and Specifications.
- D. Contractor shall fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. Contractor shall conform to all Code requirements for penetrations or the Drawings and Specifications, whichever calls for a higher quality or more thorough requirement. Contractor shall maintain integrity of both rated and non-rated fire walls, ceilings, floors, etc.
- E. Contractor shall restore Work which has been cut or removed. Contractor shall install new products to provide completed Work in accordance with requirements of the Contract Documents and as required to match surrounding areas and surfaces.
- F. Contractor shall refinish all continuous surfaces to nearest intersection as necessary to match the existing finish to any new finish.

END OF SECTION

06/06/18

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions; and
- C. Temporary Facilities and Controls.

1.02 SECTION INCLUDES

- A. Administrative and procedural requirements for the following:
 - (1) Salvaging non-hazardous construction waste.
 - (2) Recycling non-hazardous construction waste.
 - (3) Disposing of non-hazardous construction waste.

1.03 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.04 PERFORMANCE REQUIREMENTS

- A. General: Develop waste management plan that results in end-of Project rates for salvage/recycling of fifty percent (50%) by weight (or by volume, but not a combination) of total waste generated by the Work.

1.05 SUBMITTALS

- A. Waste Management Plan: Submit waste management plan within 30 days of date established for commencement of the Work.
- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit copies of report. Include the following information:
 - (1) Material category.
 - (2) Generation point of waste.
 - (3) Total quantity of waste in tons or cubic yards.
 - (4) Quantity of waste salvaged, both estimated and actual in tons or cubic yards.
 - (5) Quantity of waste recycled, both estimated and actual in tons or cubic yards.
 - (6) Total quantity of waste recovered (salvaged plus recycled) in tons or cubic yards.
 - (7) Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- C. Waste Reduction Calculations: Before request for final payment, submit copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- H. Qualification Data: For Waste Management Coordinator.
- I. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- J. Submittal procedures and quantities are specified in Document 01 33 00.

1.06 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: LEED Accredited Professional by U.S. Green Building Council.

- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference: Conduct conference at Project site to comply with requirements. Review methods and procedures related to waste management including, but not limited to, the following:
 - (1) Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 - (2) Review requirements for documenting quantities of each type of waste and its disposition.
 - (3) Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - (4) Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - (5) Review waste management requirements for each trade.

1.07 WASTE MANAGEMENT PLAN

- A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - (1) Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 - (2) Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - (3) Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - (4) Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 - (5) Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - (6) Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container

labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION

3.01 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - (1) Comply with Document 01 50 00 for operation, termination, and removal requirements.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
 - (1) Distribute waste management plan to everyone concerned within 3 days of submittal return.
 - (2) Distribute waste management plan to entities when they first begin work on site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - (1) Designate and label specific areas of Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - (2) Comply with Document 01 50 00 for controlling dust and dirt, environmental protection, and noise control.

3.02 RECYCLING CONSTRUCTION WASTE

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to the Contractor.
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
 - (1) Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project Site. Include list of acceptable and unacceptable materials at each container and bin.
 - (a) Inspect containers and bins for contamination and remove contaminated materials if found.

- (2) Stockpile processed materials on site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
- (3) Stockpile materials away from construction area. Do not store within drip line of remaining trees.
- (4) Store components off the ground and protect from the weather.
- (5) Remove recyclable waste off District property and transport to recycling receiver or processor.

D. Packaging:

- (1) Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
- (2) Polystyrene Packaging: Separate and bag material.
- (3) Pallets: As much as possible, require deliveries using pallets to remove pallets from Project Site. For pallets that remain on Site, break down pallets into component wood pieces and comply with requirements for recycling wood.
- (4) Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

E. Site-Clearing Wastes: Chip brush, branches, and trees on site.

F. Wood Materials:

- (1) Clean Cut-Offs of Lumber: Grind or chip into small pieces.
- (2) Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

G. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.

- (1) Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.03 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project Site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

- (1) Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on site.
- (2) Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off District property and legally dispose of them.

END OF SECTION

06/06/18

SECTION 01 77 00

CONTRACT CLOSEOUT AND FINAL CLEANING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Completion of Work;
- B. Special Conditions;
- C. Temporary Facilities and Controls.

1.02 CLOSEOUT PROCEDURES

- A. Contractor shall comply with all closeout provisions as indicated in the General Conditions.

1.03 FINAL CLEANING

- A. Contractor shall execute final cleaning prior to final inspection.
- B. Contractor shall clean interior and exterior glass and all surfaces exposed to view; remove temporary labels, tape, stains, and foreign substances, polish transparent and glossy surfaces, wax and polish new vinyl floor surfaces, vacuum carpeted and soft surfaces.
- C. Contractor shall clean equipment and fixtures to a sanitary condition.
- D. Contractor shall replace filters of operating equipment.
- E. Contractor shall clean debris from roofs, gutters, down spouts, and drainage systems.
- F. Contractor shall clean Site, sweep paved areas, and rake clean landscaped surfaces.
- G. Contractor shall remove waste and surplus materials, rubbish, and construction facilities from the Site and surrounding areas.

1.04 ADJUSTING

- A. Contractor shall adjust operating products and equipment to ensure smooth and unhindered operation.

1.05 RECORD DOCUMENTS AND SHOP DRAWINGS

- A. Contractor shall legibly mark each item to record actual construction, including:
 - (1) Measured depths of foundation in relation to finish floor datum.
 - (2) Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permit surface improvements.

- (3) Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - (4) Field changes of dimension and detail.
 - (5) Details not on original Contract Drawings
 - (6) Changes made by modification(s).
 - (7) References to related Shop Drawings and modifications.
- B. Contractor will provide one set of Record Drawings to District.
 - C. Contractor shall submit all required documents to District and/or Architect prior to or with its final Application for Payment.

1.06 INSTRUCTION OF DISTRICT PERSONNEL

- A. Before final inspection, at agreed upon times, Contractor shall instruct District's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. For equipment requiring seasonal operation, Contractor shall perform instructions for other seasons within six months or by the change of season.
- C. Contractor shall use operation and maintenance manuals as basis for instruction. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- D. Contractor shall prepare and insert additional data in Operation and Maintenance Manual when the need for such data becomes apparent during instruction.
- E. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Contractor shall provide products, spare parts, maintenance, and extra materials in quantities specified in the Specifications and in Manufacturer's recommendations.
- B. Contractor shall provide District with all required Operation and Maintenance Data at one time. Partial or piecemeal submissions of Operation and Maintenance Data will not be accepted.

PART 2 – PRODUCTS Not used.

PART 3 – EXECUTION Not used.

END OF SECTION

06/06/18

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Completion of the Work;
- B. Special Conditions.

1.02 QUALITY ASSURANCE

- A. Contractor shall prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.03 FORMAT

- A. Contractor shall prepare data in the form of an instructional manual entitled "OPERATIONS AND MAINTENANCE MANUAL & INSTRUCTIONS" ("Manual").
- B. Binders: Contractor shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two inch maximum ring size. When multiple binders are used, Contractor shall correlate data into related consistent groupings.
- C. Cover: Contractor shall identify each binder with typed or printed title "OPERATION AND MAINTENANCE MANUAL & INSTRUCTIONS"; and shall list title of Project and identify subject matter of contents.
- D. Contractor shall arrange content by systems process flow under section numbers and sequence of Table of Contents of the Contract Documents.
- E. Contractor shall provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: The content shall include Manufacturer's printed data, or typewritten data on 24 pound paper.
- G. Drawings: Contractor shall provide with reinforced punched binder tab and shall bind in with text; folding larger drawings to size of text pages.

1.04 CONTENTS, EACH VOLUME

- A. Table of Contents: Contractor shall provide title of Project; names, addresses, and telephone numbers of the Architect, any engineers, subconsultants, Subcontractor(s), and Contractor with name of responsible parties; and schedule of products and systems, indexed to content of the volume.
- B. For Each Product or System: Contractor shall list names, addresses, and telephone numbers of Subcontractor(s) and suppliers, including local source of supplies and replacement parts.

- C. Product Data: Contractor shall mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- D. Drawings: Contractor shall supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Contractor shall not use Project Record Documents as maintenance drawings.
- E. Text: The Contractor shall include any and all information as required to supplement product data. Contractor shall provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.
- F. Warranties and Bonds: Contractor shall bind in one copy of each.

1.05 MANUAL FOR MATERIALS AND FINISHES

- A. Building Products, Applied Materials, and Finishes: Contractor shall include product data, with catalog number, size, composition, and color and texture designations. Contractor shall provide information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Contractor shall 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: Contractor shall include product data listing applicable reference standards, chemical composition, and details of installation. Contractor shall provide recommendations for inspections, maintenance, and repair.
- D. Additional Requirements: Contractor shall include all additional requirements as specified in the Specifications.
- E. Contractor shall provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.06 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Each Item of Equipment and Each System: Contractor shall include description of unit or system, and component parts and identify function, normal operating characteristics, and limiting conditions. Contractor shall include performance curves, with engineering data and tests, and complete nomenclature, and commercial number of replaceable parts.
- B. Panelboard Circuit Directories: Contractor shall provide electrical service characteristics, controls, and communications.
- C. Contractor shall include color coded wiring diagrams as installed.
- D. Operating Procedures: Contractor shall include start-up, break-in, and routine normal operating instructions and sequences. Contractor shall include regulation, control, stopping, shut-down, and emergency instructions. Contractor shall include summer, winter, and any special operating instructions.
- E. Maintenance Requirements: Contractor shall include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- F. Contractor shall provide servicing and lubrication schedule, and list of lubricants required.

- G. Contractor shall include manufacturer's printed operation and maintenance instructions.
- H. Contractor shall include sequence of operation by controls manufacturer.
- I. Contractor shall provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Contractor shall provide control diagrams by controls manufacturer as installed.
- K. Contractor shall provide Contractor's coordination drawings, with color coded piping diagrams as installed.
- L. Contractor shall provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- M. Contractor shall provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- N. Additional Requirements: Contractor shall include all additional requirements as specified in Specification(s).
- O. Contractor shall provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.07 SUBMITTAL

- A. Contractor shall submit to the District for review two (2) copies of preliminary draft or proposed formats and outlines of the contents of the Manual within thirty (30) days of Contractor's start of Work.
- B. For equipment, or component parts of equipment put into service during construction and to be operated by District, Contractor shall submit draft content for that portion of the Manual within ten (10) days after acceptance of that equipment or component.
- C. Contractor shall submit two (2) copies of a complete Manual in final form prior to final Application for Payment. Copy will be returned with Architect/Engineer comments. Contractor must revise the content of the Manual as required by District prior to District's approval of Contractor's final Application for Payment.
- D. Contractor must submit two (2) copies of revised Manual in final form within ten (10) days after final inspection.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF SECTION

06/06/18

SECTION 01 78 36

WARRANTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Warranty/Guarantee Information;
- B. Special Conditions.

1.02 FORMAT

- A. Binders: Contractor shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two inch maximum ring size.
- B. Cover: Contractor shall identify each binder with typed or printed title "WARRANTIES" and shall list title of Project.
- C. Table of Contents: Contractor shall provide title of Project; name, address, and telephone number of Contractor and equipment supplier; and name of responsible principal. Contractor shall identify each item with the number and title of the specific Specification, document, provision, or section in which the name of the product or work item is specified.
- D. Contractor shall separate each warranty with index tab sheets keyed to the Table of Contents listing, providing full information and using separate typed sheets as necessary. Contractor shall list each applicable and/or responsible Subcontractor(s), supplier(s), and/or manufacturer(s), with name, address, and telephone number of each responsible principal(s).

1.03 PREPARATION

- A. Contractor shall obtain warranties, executed in duplicate by each applicable and/or responsible subcontractor(s), supplier(s), and manufacturer(s), within ten (10) days after completion of the applicable item or work. Except for items put into use with District's permission, Contractor shall leave date of beginning of time of warranty until the date of completion is determined.
- B. Contractor shall verify that documents are in proper form, contain full information, and are notarized, when required.
- C. Contractor shall co-execute submittals when required.
- D. Contractor shall retain warranties until time specified for submittal.

1.04 TIME OF SUBMITTALS

- A. For equipment or component parts of equipment put into service during construction with District's permission, Contractor shall submit a draft warranty for that equipment or component within ten (10) days after acceptance of that equipment or component.

- B. Contractor shall submit for District approval all warranties and related documents within ten (10) days after date of completion. Contractor must revise the warranties as required by the District prior to District's approval of Contractor's final Application for Payment.
- C. For items of work delayed beyond date of completion, Contractor shall provide an updated submittal within ten (10) days after acceptance, listing the date of acceptance as start of warranty period.

PART 2 - PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF SECTION

06/06/18

RECORD DOCUMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Documents on Work;
- B. Special Conditions.

PART 2 - RECORD DRAWINGS

2.01 GENERAL

- A. As indicated in the Contract Documents, the District will provide Contractor with one set of reproducible, full size original Contract Drawings (mylars).
- B. Contractor shall maintain at each Project Site one set of marked-up plans and shall transfer all changes and information to those marked-up plans, as often as required in the Contract Documents, but in no case less than once each month. Contractor shall submit to the Project Inspector one set of reproducible vellums of the Project Record Drawings ("As-Builts") showing all changes incorporated into the Work since the preceding monthly submittal. The As-Builts shall be available at the Project Site. The Contractor shall submit reproducible vellums at the conclusion of the Project following review of the blueline prints.
- C. Label and date each Record Drawing "RECORD DOCUMENT" in legibly printed letters.
- D. All deviations in construction, including but not limited to pipe and conduit locations and deviations caused by without limitation Change Orders, Construction Claim Directives, RFI's, and Addenda, shall be accurately and legibly recorded by Contractor.
- E. Locations and changes shall be done by Contractor in a neat and legible manner and, where applicable, indicated by drawing a "cloud" around the changed or additional information.

2.02 RECORD DRAWING INFORMATION

- A. Contractor shall record the following information:
 - (1) Locations of Work buried under or outside each building, including, without limitation, all utilities, plumbing and electrical lines, and conduits.
 - (2) Actual numbering of each electrical circuit to match panel schedule.
 - (3) Locations of significant Work concealed inside each building whose general locations are changed from those shown on the Contract Drawings.
 - (4) Locations of all items, not necessarily concealed, which vary from the Contract Documents.

- (5) Installed location of all cathodic protection anodes.
- (6) Deviations from the sizes, locations, and other features of installations shown in the Contract Documents.
- (7) Locations of underground work, points of connection with existing utilities, changes in direction, valves, manholes, catch basins, capped stubouts, invert elevations, etc.
- (8) Sufficient information to locate Work concealed in each building with reasonable ease and accuracy.

In some instances, this information may be recorded by dimension. In other instances, it may be recorded in relation to the spaces in the building near which it was installed.

- B. Contractor shall provide additional drawings as necessary for clarification.
- C. Contractor shall provide reproducible record drawings, made from final Shop Drawings marked "No Exceptions Taken" or "Approved as Noted."
- D. After review and approval of the marked-up specifications by the Project Inspector, Contractor shall provide electronic copies of the drawings (in PDF format) with one file with all of the sheets and one set of individual sheet files at the conclusion of the Project.

PART 3 - RECORD SPECIFICATIONS

3.01 GENERAL

- A. Contractor shall mark each section legibly to record manufacturer, trade name, catalog number, and supplier of each Product and item of equipment actually installed.
- B. After review and approval of the marked-up specifications by the Project Inspector, Contractor shall provide one electronic copy of the specifications (in PDF format) at the conclusion of the Project.

PART 4 - MAINTENANCE OF RECORD DOCUMENTS

4.01 GENERAL

- A. Contractor shall store Record Documents apart from documents used for construction as follows:
 - (1) Provide files and racks for storage of Record Documents.
 - (2) Maintain Record Documents in a clean, dry, legible condition and in good order.
- B. Contractor shall not use Record Documents for construction purposes.

PART 5 – PRODUCTS Not Used.

END OF SECTION

06/06/18

SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Salvage of existing items to be reused or recycled.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Requirements:

1. Section 01 11 00 "Summary of Work" for restrictions on the use of the premises, and Owner-occupancy requirements.
2. Section 01 35 16 "Alteration Project Procedures" for general protection and work procedures for alteration projects.
3. Section 01 73 29 "Cutting and Patching" for cutting and patching procedures.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for storage.

C. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.
2. Review structural load limitations of existing structure.

3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.
6. Review areas where existing construction is to be removed, salvaged, and reinstalled in the project.
7. Review areas where existing construction is to be removed and salvaged to the Owner.

1.5 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 3. Coordination for shutoff, capping, and continuation of utility services.
 4. Use of elevator and stairs.
 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before Work begins.

1.6 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.7 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 1. Before selective demolition, Owner will remove the following items:
 - a. Library shelving and casework.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

- D. Hazardous Materials: Present in building and components to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or preconstruction videotapes.

1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.--+

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 1. Comply with requirements for existing services/systems interruptions specified in Section 01 11 00 "Summary of Work."
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 3. Disconnect, demolish, and remove sanitary sewer and storm drain piping indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 50 00 "Temporary Facilities and Controls."
- B. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 5. Maintain adequate ventilation when using cutting torches.
 6. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 7. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Comply with requirements for access and protection specified in Section 01 50 00 "Temporary Facilities and Controls."
- C. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner.
 5. Protect items from damage during transport and storage.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
- B. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- C. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Remove demolished materials from Project site and recycle or dispose of them according to Section 01 74 19 "Construction Waste Management and Disposal".
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn demolished materials.

3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.8 SELECTIVE DEMOLITION SCHEDULE

- A. Existing Items to Be Removed:
 - 1. Designated (e) doors, door frames, and all related accessories.
 - 2. Designated (e) interior wall.
 - 3. Designated (e) interior window.
 - 4. Designated (e) casework.
 - 5. Designated (e) display case.
 - 6. Designated (e) book drop.
 - 7. Designated (e) exterior window.
 - 8. Designated (e) finish flooring.
 - 9. Designated (e) storefront system
 - 10. Designated (e) concrete wall.
 - 11. Designated (e) markerboards.
 - 12. Designated (e) drinking fountains.
 - 13. Designated (e) concrete pavement.
 - 14. Designated (e) trees.
 - 15. Designated (e) landscaping.
 - 16. Designated (e) lighting fixtures.
 - 17. Designated (e) suspended acoustical ceilings.
 - 18. Designated (e) soffits.
 - 19. Designated (e) sidewall grilles.
 - 20. Designated (e) thermostats.
 - 21. Designated (e) ceiling diffusers and ductwork in soffit and above ceiling.
- B. Existing Items to Be Removed and Salvaged:
 - 1. Scope to be determined.
- C. Existing Items to Remain:
 - 1. Designated (e) concrete walls.
 - 2. Designated (e) concrete columns.
 - 3. Designated (e) doors.
 - 4. Designated (e) interior partitions.
 - 5. Designated (e) mechanical closets.
 - 6. Designated (e) catch basins.
 - 7. Designated (e) concrete pavement.

8. Designated (e) ceiling lights.
9. Designated (e) ceilings.
10. Designated (e) ac units, ductwork on roof, and duct drops.

END OF SECTION

06/06/18

SECTION 03 11 00

CONCRETE FORMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Furnishing, installing, and removing of forms for cast-in-place concrete.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES

- A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the formwork only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

American Concrete Institute (ACI)
Corps of Engineers
U. S. Department of Commerce Product Standard (PS)
Western Wood Products Association (WWPA)
West Coast Lumber Inspection Bureau (WCLIB)

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications for form ties, spreaders and coating.
- B. Samples: Submit samples of form ties and spreaders.
- C. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 REGULATORY REQUIREMENTS

- A. Except as modified by the requirements specified herein or the details on the drawings, formwork shall conform to the 2016 California Building Code (CBC) Title 24 Part 2, Chapter 19A - Concrete.
- B. CalGreen Requirements: Form coatings shall comply with environmental requirements of 2016 California Building Code (CBC) Title 24 Part 11.
 - 1. The quantity of volatile organic compounds (VOC) used in coating products shall not exceed the limits permitted under the current regulations for architectural coatings of the Bay Area Air Quality Management District.

PART 2 - PRODUCTS

2.1 FORM FACING MATERIALS

- A. Forms for Unexposed Concrete: Form concrete surfaces that will not be exposed in the finished structure with plywood, lumber, metal or other acceptable material.
 - 1. Lumber: Standard or better grade Douglas fir, meeting the requirements of WCLIB "Standard No. 17, Grading Rules for West Coast Lumber" or WWPA "Western Lumber Grading Rules 2011". Use boards that are surfaced on at least 2 edges and one side for a tight fit.
 - 2. Plywood: B-B Plyform, Class I, Exterior grade meeting the requirements of PS 1-09, 5/8-inch minimum thickness for 12-inch stud spacing and 3/4-inch minimum thickness for 16-inch stud spacing.
- B. Forms for Exposed Finish Concrete: Construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practical sizes to minimize number of joints. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.
 - 1. Where an as cast surface finish is indicated, provide High Density Overlay Plyform Class I Exterior plywood meeting the requirements of PS 1-09.
 - 2. Where sacked, rubbed or sandblasted surface finish is indicated, provide B-B Plyform Class I Exterior plywood meeting the requirements of PS 1-09.
- C. Form Liners: Form architectural finish concrete surfaces with PVC or ABS plastic, fiberglass reinforced plastic or elastomeric urethane form liners of face design indicated.
- D. Waterstops: PVC plastic of the shape and size indicated, and meeting the requirements of Corps of Engineers Specification CRD-C-572-89.
- E. Framing, Studding and Bracing: "Standard" or "Construction" grade Douglas fir, rough or S4S, meeting the requirements of WCLIB "Standard No. 17, Grading Rules for West Coast Lumber" or WWPA "Western Lumber Grading Rules 2011".
- F. Form Ties and Spreaders: Standard metal form clamp assembly, of type acting as spreaders and leaving no metal within 1-inch of concrete face. Inner tie rod shall be left in concrete when forms are removed. Wire ties or wood spreaders will not be permitted.
- G. Form Coating: Non-grain raising and non-staining type that will not leave residual matter on surface of concrete or adversely affect proper bonding of subsequent application of other material applied to concrete surface. Coatings containing mineral oils or other nondrying ingredients will not be permitted. Form coating for use with form liners shall be of type recommended by form liner manufacturer.
- H. Nails: Common wire, steel.

PART 3 - EXECUTION

3.1 DESIGN OF FORMWORK

- A. Carry out the engineering and construction of all formwork, shoring, and bracing, by and under the direction of the Contractor. The Contractor shall be held responsible for the engineering, construction, maintenance, and safety of all formwork during the entire construction period.

- B. The formwork shall be designed for the loads and lateral pressures outlined in Part 3, Section 102, of ACI 347R-14, and lateral forces as specified by the CBC Title 24 Part 2.

3.2 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117. Camber formwork where necessary to compensate for anticipated deflections due to fresh concrete and construction loads.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
1. Class A, 1/8 inch for smooth-formed finished surfaces.
 2. Class B, 1/4 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
1. Install keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete 3/4-inch, unless otherwise indicated. Provide molding in forms for all chamfering required.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coating of Forms: Thoroughly clean forms and coat with specified form coating before each use. Do not reuse forms for exposed construction which cannot be reconditioned to "like new" condition. Apply form coating to forms in accordance with the manufacturer's specifications. Apply form coating to forms before placing reinforcing steel.
- M. Earth Forms: Earth forms may be used for footings only where the soil is firm and stable and the concrete will not be exposed to view. Where earth forms are to be used,

excavations shall be cut neat and accurately to size for placing of concrete directly against the excavation. Except for bottom of footings, allow for one-inch additional concrete beyond the dimensions or profiles shown on the drawings. Construct wood edge strips at each side of trench at top to secure reinforcing and prevent trench from sloughing. Form sides of footings where earth sloughs more than 6-inches. Earth forms shall be tamped firm and cleaned of all debris and loose material before depositing concrete.

- N. Wood Forms: Construct forms of sound material to the correct shape and dimensions, mortar tight, and of sufficient strength, and so braced and tied together that the movement of men, equipment, materials, or placing and vibrating the concrete will not throw them out of exact shape under imposed loads. They shall be so constructed that they may be easily removed without damage to the concrete. Before concrete is placed in forms, carefully verify the horizontal and vertical position of the form and correct inaccuracies. Complete wedging and bracing in advance of placing of concrete.
- O. Form Liners: Position liners on the forms so that grooves and joints are aligned with tie slots. Attach form liners to plywood forms with staples and to metal forms with sheet metal screws or pop rivets. Space fasteners not to exceed 4-inches on centers around the perimeter of each sheet. Place staples perpendicular to the edges. Install staples using a power staple with pressure regulated so that staple heads are driven flush with the surface. Seal joints between liners and joints at top and bottoms of liners with foam tape placed on the backside of liners.
- P. Framing bracing, supporting members, and centering shall be of ample size and strength to safely carry, without deflection, dead and live loads to which forms may be subjected, and shall be spaced sufficiently close to prevent bulging or sagging of forms. Concrete out of line, level, or plumb will be cause for rejection of the whole construction affected.
- Q. Tolerances: Formwork shall be constructed so as to ensure that the concrete surfaces will conform to the tolerances of ACI 117-10.
- R. Chamfered Corners: Chamfer exposed corners 3/4-inch, unless otherwise indicated. Provide molding in forms for all chamfering required.
- S. Form Ties: Use ties of sufficient strength and in sufficient quantities to prevent spreading of the forms. Place ties at least 1 inch away from the finished surface of the concrete.
- T. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.
- U. Joints: Install construction joints, isolation joints, shrinkage control joints and expansion joints as approved. Coordinate location of construction joints, particularly those exposed to view at walls and columns, in advance of concrete placement.
- V. Embedded Piping and Rough Hardware:
 - 1. Coordinate with other trades who are required to fasten materials to formwork, or who are required to insert piping, boxes, bolts, anchors, inserts, or other rough hardware, within the forms.
 - 2. Locate conduits or pipes so as not to reduce the strength of the construction, and in no case place in a slab less than 4-inches thick except for local offsets. Do not bury conduit in a concrete slab with an outside diameter greater than 30 percent of the thickness of the slab, and do not place conduit under slab reinforcing steel, except for slab mesh. Place conduits parallel to roof slab span.

- W. Waterstops: Install waterstops to form a continuous diaphragm at each joint. Make provisions to support and protect exposed waterstops during progress of construction. Fabricate field joints in waterstops in accordance with manufacturer's printed instructions.
- X. Inspection: Before placing of concrete, and after placement of reinforcing steel in the forms, provide notification so that proper inspection can be made. Make such notification at least 2 working days in advance of placing concrete.
- Y. Rejection of Defective Work: Any movement or bellying of forms during construction or variations in excess of the tolerances specified will be considered just cause for the removal of such forms and, in addition, the concrete construction so affected. Reconstruct forms, place new concrete and required reinforcing steel at no additional cost to the Owner.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.
- D. When shores and other vertical supports are so arranged that the form facing material may be removed without loosening or disturbing the shores and supports, the facing material may be removed at an earlier age as specified or permitted. The shores and supports shall remain in place until the concrete has reached its specified 28-day strength, unless otherwise specified or permitted.
- E. Whenever the formwork is removed during the curing period, cure the exposed concrete by one of the methods specified in Section 03 30 00.
- F. Construction loads exceeding the design loads shall not be imposed on any member unless it is properly shored and braced.
- G. Use softwood wedges to release form faces from concrete. Do not pry with metal tool.

3.4 SHORING AND RESHORING INSTALLATION

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
 - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

- B. When reshoring is permitted or required the operations shall be planned in advance and shall be subject to review.
- C. Perform reshoring for the purpose of early form removal so that at no time will large areas of new construction be required to support their own weight. While reshoring is under way, no live loads shall be permitted on the new construction. Tighten reshores to carry their required loads but do not over tighten so that the new construction is overstressed. Reshores shall remain in place until the concrete has reached its specified 28-day strength, unless otherwise specified or permitted.

END OF SECTION

06/08/18

SECTION 03 20 00

CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Reinforcing steel for cast-in-place concrete.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES

- A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the formwork only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

American Concrete Institute (ACI)
American Society for Testing and Materials (ASTM International)
Concrete Reinforcing Steel Institute (CRSI)
American Welding Society (AWS)
American Concrete Institute (ACI)

1.3 ACTION SUBMITTALS

- A. Product Data: Submit mill affidavits, stating the grades and physical and chemical properties of the reinforcing steel, and conformance with ASTM Specifications, before delivery of the steel to the project site.
- B. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- C. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4.

1.6 REGULATORY REQUIREMENTS

- A. Except as modified by the requirements specified herein or the details on the drawings, reinforcing steel shall conform to the 2016 California Building Code (CBC) Title 24 Part 2, Chapter 19A - Concrete.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver reinforcement bundled and tagged to identify placement and certify testing.
- B. Transport reinforcing steel to the construction site, store and cover in a manner that will ensure that no damage occurs to it from moisture, dirt, grease, or other cause that might impair bond to concrete. Store a sufficient supply of approved reinforcing steel on the construction site at all times to ensure that there will be no delay of the construction. Maintain identification of steel after bundles are broken.

1.8 COORDINATION

- A. Review architectural, structural, mechanical, and electrical drawings for anchor bolt schedules and locations, anchors, inserts, conduits, sleeves, and other items which are required to be cast in concrete, and make necessary provisions as required so that reinforcing steel will not interfere with the placement of such embedded items.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT MATERIALS

- A. Reinforcing Bars: New, deformed, billet steel bars, complying with ASTM A615, except provide low alloy deformed bars complying with ASTM A706 for bars to be welded. Grades shall be as indicated. Deliver bars new and free from rust and mill scale in original bundles with mill tags intact.
- B. Welded Wire Fabric: New welded steel wire fabric, meeting the requirements of ASTM A185, of gage and center-to-center spacing as indicated. Supply welded wire fabric in flat sheets.
- C. Tie Wire: 16-gage or heavier, where indicated or specified, black or galvanized steel wire, meeting the requirements of ASTM A82.
- D. Welding Electrodes: AWS A5.1-04, grade E70XX for welding grade 40 reinforcing steel, and AWS A5.5-06 E90XX for welding grade 60 reinforcing steel.

2.2 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.3 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement in accordance with the details indicated. Where specific details are not indicated or noted, comply with the applicable requirements of CRSI's "Manual of Standard Practice," CBC Title 24 Part 2, Chapter 19A; IBC Standard 19-1; and ACI SP-66-04.

- B. Bend, cut, and place bars accurately, as indicated. Bend bars cold; heating of bars will not be permitted. Do not bend or straighten bars in any manner that will injure the material.

PART 3 - EXECUTION

3.1 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with applicable requirements of CCR Title 24 Part 2, ACI 315, and CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement. Install reinforcement accurately and secure against movement, particularly under the weight of workmen and the placement of concrete.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- E. Reinforcing Supports: Support bars and welded wire fabric larger than 8-gage on metal chairs or spacers on metal hangers, accurately placed and securely fastened to steel reinforcement in place. Support legs of accessories in forms without embedding in form surface. Space chairs and accessories in conformance with CRSI's "Recommended Practice for Placing Bar Supports". No wood will be permitted inside forms. Precast concrete cubes may be used to support reinforcing for footings and slabs on grade.
- F. Placing and Tying: Set reinforcing in place, space, and securely tie at splices and at crossing points and intersections in the position indicated, or as directed. Point ends of wire away from forms.
- G. Spacing: Space bars as indicated. Where not indicated, the clear spacing for main longitudinal column reinforcement shall be not less than 1.5 times the nominal bar diameter, or 1-1/2 inches, or 1-1/3 times the maximum size aggregate, whichever is greater. For other parallel bars, where spacing is not indicated, the minimum clear spacing shall not be less than the nominal bar diameter, or one inch, or 1-1/3 times the maximum size aggregate, whichever is less. The clear distance limitations above also apply between the bars being spliced at a contact lap splice and adjacent bars.
- H. Splices: Except for temperature bars in slabs and horizontal wall reinforcing, no splicing will be allowed for reinforcing bars unless detailed locations are indicated, or approval is given. Stagger lapped splices for horizontal wall reinforcing and slab temperature bars by the required minimum lap splice length. Wherever possible, stagger splices of adjacent bars.
- I. Dowels: Securely tie dowels in place before concrete is deposited. In the event there are no bars in position to which dowels may be tied, add a No. 3 minimum to provide proper support and anchorage. Bending of dowels after placement of concrete will not be permitted. Protect dowels extended for future construction from weather exposure. Compliance with safety law requirements for extended dowels is required.

- J. Cleaning: At time of concrete placement, clean reinforcement free of coatings that would impair bond to concrete, otherwise clean reinforcing by sandblasting as required.
- K. Welding: Welding of reinforcing steel will not be permitted except as specifically approved or detailed. Welding shall comply with IBC Standard 19-2 and AWS D1.4-11 using low hydrogen electrodes. Before welding, determine weldability of reinforcing bars by a laboratory chemical analysis.

3.2 FIELD QUALITY CONTROL

- A. Notify the District Inspector at least 2 working days ahead of each concrete pour and do not place any concrete until all reinforcing steel has been installed and approved by the Inspector. Complete all reinforcing in every way by the end of the working day before concrete placing. Testing and inspections are specified in Section 01 45 00.

3.3 DEFECTIVE WORK

- A. The following reinforcing steel construction will be considered defective and removed and replaced at no additional cost to the Owner.
 - 1. Bars with kinks or bends not indicated.
 - 2. Bars damaged by bending or straightening.
 - 3. Bars heated for bending.
 - 4. Reinforcement not placed in accordance with the drawings or specifications.

END OF SECTION

06/08/18

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Sections:
 - 1. Section 03 11 00 "Concrete Forming" for concrete formwork.
 - 2. Section 03 20 00 "Concrete Reinforcing" for reinforcing steel for cast-in-place concrete.
 - 3. Section 32 13 13 "Concrete Paving" for concrete curbs, gutters, sidewalks, and other exterior concrete paving work.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.3 REFERENCES

- A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the formwork only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

American Concrete Institute (ACI)
American Society for Testing and Materials (ASTM International)

1.4 ACTION SUBMITTALS

- A. Product Data:
 - 1. Submit certificates of compliance for portland cement.
 - 2. Submit manufacturer's technical literature for admixtures, curing compounds, expansion joint filler, sealer and chemical hardener.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.

- C. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - 1. Location of construction joints is subject to approval of the Architect.
- D. Submittal procedures and quantities are specified in Section 01 33 00.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- B. Submittal procedures and quantities are specified in Section 01 33 00.

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Except as modified by the requirements specified herein or the details indicated, concrete construction shall conform to the 2016 California Building Code (CBC) Title 24 Part 2 Chapter 19A - Concrete.
 - 2. CalGreen Requirements: Materials shall comply with environmental requirements of 2016 California Building Code (CBC) Title 24 Part 11.
 - a. The quantity of volatile organic compounds (VOC) used in materials shall not exceed the limits permitted under the current regulations for architectural coatings of the Bay Area Air Quality Management District.
- B. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- C. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete."
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301.
 - 2. ACI 117.

2.2 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Portland Cement:
 - 1. Cement shall conform to ASTM C150, Type I or II. The cement used in the work shall correspond to that on which the selection of concrete proportions was based.
 - 2. Where aggregates contain reactive substances, low alkali cement shall be used in all concrete. Low alkali cement shall not contain more than 0.6 percent total alkali when calculated as sodium oxide as determined by the method given in ASTM C114.
- C. Pozzolan: ASTM C618, Type F. Limit use of pozzolan to not more than 15 percent of cement content by weight.
- D. Regular Weight Concrete Aggregates: CCR Title 24 Part 2, Sec. 1903A.3. Use ASTM C227 to determine alkali reactivity of the aggregates as specified therein, the alkali reactivity shall be "innocuous" as determined by ASTM C289.
 - 1. Fine Aggregate: Washed clean, uniformly screen graded, and containing not more than 2 percent by weight of deleterious materials such as shale, schist, alkali, clay lumps, earth, loam, mica or similar materials. Uniformly grade fine aggregate from fine to coarse.
 - 2. Coarse Aggregate: Clean, hard, crushed rock or washed gravel, free from organic materials or soft or friable materials, containing not more than 2 percent by weight of shale or cherty material and not more than 15 percent by weight of elongated fragments.
- E. Admixtures: CBC Title 24 Part 2, Sec. 1905A.1 and ACI-318. Admixture shall be subject to acceptance by the Architect and Division of the State Architect (DSA) as to type and amount used. Admixtures shall not contain intentionally-added chlorides.
 - 1. Air-Entraining Admixture: ASTM C260. Acceptable products, or equal:

BASF Corporation; MasterAir Series
Cormix, Inc.; Air-Tite
Euclid Chemical Co.; Air-Mix
W.R. Grace & Co.; Darex AEA
Sika Corp.; AER
 - 2. Water Reducing Admixture: ASTM C494, Type A. Acceptable products, or equal:

Cormix, Inc.; PSI N
Euclid Chemical Co.; Eucon WR 75
W.R. Grace & Co.; WRDA
BASF Corporation; MasterPozzolith Series or MasterPolyheed Series

Sika Corp.; Plastocrete 161

3. Retarding Admixture: ASTM C494, Type B. Acceptable products, or equal:
BASF Corporation; MasterSet R Series or MasterSet DELVO Series
 4. Accelerating Admixture: ASTM C494, Type C. Acceptable products, or equal:
BASF Corporation; MasterSet AC 534 or MasterSet FP 20.
 5. Water Reducing and Retarding Admixture: ASTM C494, Type D. Acceptable products, or equal:
BASF Corporation; MasterSet R Series or MasterSet DELVO Series.
 6. Water Reducing and Accelerating Admixture: ASTM C494, Type E. Acceptable products, or equal:
Cormix, Inc.; Gilco Accelerator
Euclid Chemical Co.; Accelguard 90
W.R. Grace & Co.; Duraset
BASF Corporation; MasterSet FP 20.
 7. High Range Water Reducing Admixture: ASTM C494, Type F. Acceptable products, or equal:
Cormix, Inc.; PSI Super
Euclid Chemical Co.; Eucon 37
W.R. Grace & Co.; Daracem
BASF Corporation; MasterRheobuild 1000, MasterGlenium Series or PS 1466.
Sika Corp.; Sikament 300
 8. Workability-Retaining Admixture: ASTM C494, Type S. Shall retain concrete workability without affecting time of setting or early-age strength development. Acceptable products, or equal:
BASF Corporation; MasterSure Z 60.
 10. Corrosion-Inhibiting Admixture: Shall be a nominal 30 percent solution of calcium nitrite or an amine/ester-based organic corrosion-inhibiting admixture. Acceptable products, or equal:
BASF Corporation; MasterLife CI 30 or MasterLife CI 222.
 11. Shrinkage-Reducing Admixture: ASTM C494, Type S. Acceptable products, or equal:
BASF Corporation; MasterLife SRA 20 or MasterLife CRA 007.
- F. Water Used in Mixing Concrete: Potable, clean and free from deleterious amounts of acid, alkalis, organic or other materials.

2.3 CURING MATERIALS

- A. Curing Membrane: Non-staining paper meeting the requirements of ASTM C171, or 6 mil thick polyethylene film.

B. Curing Compound: Types as follows subject to the limitations specified elsewhere in this Section:

1. Non-film Forming Type: Clear, water-based solution that penetrates below the concrete surface to react with free lime to seal, harden and dust proof concrete surfaces. When tested in accordance with ASTM C156, compound shall restrict the loss of water to not more than 0.55 kg per square meter. Acceptable products, or equal:

Burke Corp.; Res-X Silicate
Dayton-Superior; Day-Chem Sil-Cure (J13)
Euclid Chemical Co.; Cure & Hard
W. R. Meadows; Med-Cure
Nox-Crete, Inc.; Bro-Cure
Sonneborn Building Products; Sonosil

2. Dissipating Resin Type: Water based, resin compound containing no wax, paraffin, gum or oil, designed to cure fresh concrete and complying with ASTM C309, Type I-D, Class B. Acceptable products, or equal:

Burke Corp.; Aqua Resin Cure
Euclid Chemical Co.; Kurez VOX
W. R. Meadows; 1100 Clear
Nox-Crete, Inc.; Resin Cure E
Symons Corp.; Resi-Chem Clear Cure
Sonneborn Building Products; Sonocure

3. Pigmented Type: Water based blend of pure waxes, polymers, additives, and alkali resistant pigments as recommended by the manufacturer of the coloring admixture. When tested in accordance with ASTM C156, compound shall restrict the loss of water to not more than 0.55 kg per square meter. Acceptable products, or equal:

L.M. Scofield Co.; Lithochrome Colorwax, Water Base
Admixtures, Inc.; Colorfull Cure-Sealer

4. Curing Sealer: Water based acrylic resin compound containing not less than 12 percent solids, designed to cure, seal and dustproof concrete floors, complying with ASTM C309, Type I, Class B. Acceptable products, or equal:

Burke Corp.; Spartan Cote WB
Dayton-Superior; Safe Cure & Seal (J-18)
Euclid Chemical Co.; Aqua-Cure VOX
W. R. Meadows; Vocomp-20
Nox-Crete, Inc.; Cure & Seal 1200E
Symons Corp.; Cure & Seal 12% Emulsion
Sonneborn Building Products; Kure-N-Seal WB

2.4 RELATED MATERIALS

- A. Expansion Joint Filler: Premolded, of sizes and thicknesses indicated, meeting the requirements of ASTM D1751.
- B. Expansion Joint Sealing Compound: Expansion joint sealant and backer rod is specified in Section 07 92 00.

2.5 REPAIR MATERIALS

- A. Leveling Compound: Cementitious, single component, non-shrink, self-leveling underlayment for concrete floors. Acceptable products, or equal:

Ardex; V-800
Burke Corp.; Flo-Tru
Dayton-Superior; LeveLayer II
Euclid Chemical Co.; Flo-Top
Symons Corp.; Floor Top
Sonneborn Building Products; Sonoflow

2.6 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Concrete Proportions and Properties:
1. Minimum Concrete Strengths at 28 Days: As indicated.
 2. Maximum Slumps: As indicated, or 4-inches for toppings on metal deck, 4-inches for slabs, footings and other horizontal members, 4-inches for walls, columns and other vertical members.
 3. Maximum Water-to-Cement Ratios: As indicated.
 4. Maximum Size Aggregate: In no case shall the maximum aggregate size used exceed one fifth of a member's thickness, one third of the depth of slabs, nor three fourths of the minimum clear spacing between individual reinforcing bars or bundles of bars. In columns and piers it shall not exceed 2/3 of the clear distance between reinforcement. In addition, it shall never exceed the size indicated for the following:
 - a. Slabs 6 inches and less in thickness: 1-inch.
 - b. Walls less than 8 inches in thickness: 1-inch.
 5. Admixtures: Admixtures shall be added in accordance with the manufacturer's instruction.
 - a. High range water reducing accelerating admixtures may be used, at the Contractor's option, to improve workability and finishing of low slump concrete mixes and to produce flowable concrete for pumping. Dosages shall be determined by the manufacturer after testing of cements and aggregates to be used.
 - b. Water reducing admixtures may be used, at the Contractor's option, to improve workability and finishing of low slump concrete mixes.
 - c. Water reducing, accelerating admixtures may be used, at the Contractor's option, to achieve early strength for earlier form removal.
 - d. Air entraining admixture may be used, at the Contractor's option, to improve workability of low slump concrete mixes.
- C. Grout: One part portland cement and 2 parts fine aggregate, by volume. Grout shall be of a consistency suitable for the intended purpose and shall be used immediately after mixing. Grout used under minor bearing plates shall be "drypack" and shall be rammed into place.

Small quantities of grout may be mixed by hand, but grout requiring 1/2 sack of cement, or more, per batch shall be machine mixed.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and ASTM C 1116/C 1116M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
 - 2. Use ready mixed concrete, mixed and transported in accordance with ASTM C94.
 - 3. Retempering: Mix concrete only in quantities for immediate use. Discard concrete which has set, do not retemper.
 - 4. Indiscriminate addition of water to increase slump is prohibited. When concrete arrives at the project with slump below that suitable for placing, water may be added only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded. Incorporate the water by additional mixing equal to at least half of the total mixing required. Accompany addition of water above that permitted by the limitation of water-cement ratio by a quantity of cement sufficient to maintain the proper water-cement ratio. Obtain approval.
 - 5. In the event concrete is mixed at a central batching plant, the delivery shall be arranged so that intervals between batches are kept at a minimum, and in any event not more than 30 minutes. Trucks shall be in first class condition and kept in constant rotation during delivery. No water shall be added during transit or at the job without specific instructions from the civil engineer responsible for the mix design. Concrete shall be placed within 90 minutes after addition of water and admixtures.

2.8 SOURCE QUALITY CONTROL

- A. General: Submit mill tests and manufacturer's certification of compliance with ASTM Specifications to the Inspector in lieu of testing of cement and aggregate analysis.
- B. Mix Designs:
 - 1. Mix designs shall be made by the contractor's concrete supplier under the supervision of a California Registered Civil Engineer, who shall determine mix proportions to fulfill the specified requirements for strength, aggregate size and workability of concrete, and such designs shall be used in proportioning all structural concrete. Mix designs shall bear the signature and seal of the California Registered Engineer. Two copies of the mix designs shall be filed with the Architect for record purposes only, not for review or approval.
 - 2. Make mix designs in accordance with ACI 318 Sec. 5.3 and CBC Title 24 Part 2, Sec. 1904A.2. The Owner in accordance with Section 01 45 23 will pay costs for mix design.
 - 3. Cover and clear distances between reinforcing bars shown on the drawings shall be considered in determining the aggregate size for mix designs, which may result in an aggregate size smaller than the maximum aggregate size stipulated elsewhere in this specification.

4. A list specifying the intended usage of each mix design shall be clearly shown as part of the designs.
 5. The maximum water-cement ratio for concrete intended for use in interior slabs-on-grade shall be 0.50.
 6. Mix designs shall be reviewed and approved by the Owner's Testing Laboratory for compliance with the contract documents, with "NO EXCEPTIONS TAKEN".
- C. Owner's Testing Laboratory shall provide continuous inspection at concrete batch plant, unless the requirements of CCR, T24 Sec. 1705A.3.3 are met.

PART 3 - EXECUTION

3.1 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 3. Locate joints for slabs in the middle third of spans.
 4. Locate horizontal joints in walls and columns at underside of floors and slabs, and at top of footings or floor slabs.
 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.

2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 07 92 00 "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.2 CONVEYING AND PLACING CONCRETE

- A. Notify the Owner's Inspector and DSA at least 2 working days in advance of the placing of any concrete.
- B. Geotechnical Engineer shall inspect soil bottoms for footings and slabs before placing concrete.
- C. Before placing concrete, forms shall be thoroughly inspected. Remove wood chips, dirt, etc., take out temporary bracing and cleats, box openings for pipes, etc., secure forms in their correct position and make tight, secure reinforcement, anchors, and embedded items in their proper places. Concrete which may be on the forms or reinforcement, and which is set and dry, shall be cleaned off and the forms and steel washed off before proceeding. Remove water and all foreign matter from forms and excavations.
- D. Subgrade Preparation: Before concrete floor slabs on grade are poured, place vapor barrier over prepared subgrade, lapping all joints not less than 4-inches. Seal all joints and punctures in vapor barriers with pressure sensitive tape.
- E. Surface Preparation: Before new concrete is deposited against hardened concrete, and before masonry is placed on concrete, remove all incrustations and laitance from forms, reinforcing, and surface of hardened concrete. If the surface mortar and laitance of the first concrete pour has not been completely removed by water blasting, the hardened concrete surface shall receive a sandblast treatment exposing the coarse aggregate, to 1/4-inch amplitude. Surfaces that are to receive drypack shall also be prepared as herein specified.
- F. Handling and Depositing:
1. Concreting, once started, shall be carried on as a continuous operation until the section of approved size and shape is completed.
 2. Handle concrete as rapidly as practicable from the mixer to the place of final deposit by methods that prevent the separation or loss of ingredients. Deposit concrete as neatly as practicable, in its final position to avoid rehandling or flowing.
 3. Concrete shall not be dropped freely where reinforcing will cause segregation, nor shall it be dropped freely more than 4-feet. Concrete shall be deposited to maintain a plastic surface approximately horizontal.
 4. Do not deposit concrete that has partially hardened in the work. Concrete shall not be retempered nor used after having stood 15 minutes after leaving the truck or mixer.
- G. Vibrating and Compacting:
1. Thoroughly consolidate all concrete and compact by suitable means during the operation of placing and depositing. Thoroughly work all concrete around

reinforcement, embedded items, and into the corners of the forms. Concrete against forms shall be thoroughly vibrated. Use internal vibrators under experienced supervision and keep out of contact with reinforcement and wood forms.

2. Vibrate close to the forms but do not continue at one spot to the extent that large areas of grout are formed or the heavier aggregates are caused to settle. Take care not to disturb concrete that has taken its initial set.

H. Flatwork:

1. Set edge forms and intermediate screed strips accurately to produce the designed elevations and contours in the finished surface, and sufficiently strong to support vibrating bridge screeds or roller pipe screeds if the nature of the finish specified requires the use of such equipment. Align concrete surface to the contours of screed strips by the use of strike-off templates or approved compacting type screeds.
2. When the formwork is cambered, set screeds to a like camber to maintain the proper concrete thickness.
3. Locate and detail joints in slabs on grade as indicated.
4. Thoroughly consolidate concrete slabs. Use internal vibration along the bulkheads of slabs on grade. Obtain consolidation of slabs and floors with vibrating bridge screeds, roller pipe screeds, or other approved means. Concrete to be consolidated shall be as dry as practical and the surfaces thereof shall not be manipulated before the finishing operations.

3.3 TEMPERATURE REQUIREMENTS

A. Cold Weather Requirements:

1. Concrete shall not be mixed or placed when the temperature is below 40 degrees F or when conditions indicate that the temperature will fall below 40 degrees F within 72 hours.
2. Concrete temperature shall be maintained, when deposited at not less than 60 degrees F. In cold weather, the reinforcement, forms, and ground which concrete will contact must be completely free of frost.
3. The concrete and formwork must be kept at a temperature of not less than 50 degrees F for not less than 72 hours after placing.

- B. Hot Weather Requirements: The maximum placing temperature of the concrete, when deposited, shall not exceed 90 degrees F without the use of special procedures. If the weather causes the placing temperature to exceed 90 degrees F, the mix shall be cooled by wetting the aggregate or other appropriate method as directed by the Architect.

3.4 FINISHING FORMED SURFACES

- A. General: Provide sacked or rubbed finishes where indicated. Provide sacked finish where no other finish is indicated. As-cast finish not acceptable.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces to receive a rubbed finish.
- C. Sacked Finish: Remove fins, rough spots, stains and hardened mortar by carefully rubbing with a fine abrasive stone to a smooth even surface. Remove excess form sealer by carefully scrubbing surface with 5 to 10 percent solution of muriatic acid. Fill holes or irregular surfaces. Apply a slurry proportioned one part cement to 1-1/2 parts sand, passing a No. 16 sieve, by damp loose volume, mixed with sufficient water to form a grout having the consistency of thick paint. Before applying slurry to surfaces, dampen concrete sufficiently to prevent water absorption. Spread slurry over surfaces with a clean sponge rubber float to completely fill holes and imperfections. Float surface vigorously, and while slurry is still plastic remove excess grout. Allow to dry then rub with burlap to completely remove dry grout so that no visible grout film remains. Complete the entire cleaning operation for any area the day it is started.
 - D. Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than the cement paste drawn from the concrete by the rubbing process.

3.5 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Finishes for Flatwork:
 1. Floated Finish: Provide floated finish for subfloors for ceramic and quarry tile and for interior stair treads and landings. After concrete has been placed, struck off, consolidated and leveled, do not work concrete further until ready for floating. Begin floating when water sheen has disappeared, or when mix has stiffened sufficiently to permit proper operation of a power-driven float. Consolidate surface with power-driven floats of impact type. Hand float with wood or cork-faced floats in locations inaccessible to power-driven machine. Recheck trueness of surface at this stage with a 10-foot straight-edge applied at not less than two different angles. Cut down high spots and fill low spots during this procedure to produce planes checking true under the straightedge in all directions, with tolerances not exceeding those specified below. Refloat slab immediately to a uniform, smooth, granular texture.
 - a. Tolerances for floors indicated to receive thin set ceramic tile applications shall not exceed 1/8-inch in 12-feet.
 - b. Tolerances for all other floors shall not exceed 1/4-inch in 12-feet.
 - c. Finish floors that do not meet specified tolerances shall be leveled to within the specified tolerances using a leveling compound.
 2. Troweled Finish: Provide troweled finish for interior concrete finish floors and subfloors for resilient flooring and carpet. Finish surface with impact power floats, as specified above where applicable, then with power trowels, and finally with hand trowels. Perform first troweling after power floating with a power trowel to produce a smooth surface which is relatively free of defects but which may still contain some trowel marks. Perform additional troweling by hand after surface has hardened sufficiently. Perform final troweling when a ringing sound is produced as trowel is moved over surface. Thoroughly consolidate surface by hand troweling operations. Finished surface shall be free of trowel marks and shall be uniform in texture and appearance. On surfaces intended to support floor covering, remove by grinding, defects of sufficient magnitude to show through floor covering. Particular care shall

be taken to finish troweling around the edges of the slabs so finish surface edges shall be at same elevations as the rest of the top surface of the slab.

3. Edge and Joint Finish: Use standard tools to produce rounded edge corners and intermediate line scoring.
4. Mark-Off Lines: Form mark-off lines with curved edging tool, neat and true to line, uniform throughout. Conform to markings indicated.
5. Concrete Sealer: All concrete floors not indicated in the schedule to receive other finish shall receive 2 coats of sealer specified herein. Spray apply in perpendicular directions. First coat shall be applied as a curing compound. Apply final coat just prior to occupation of buildings. Before applying final coat, remove dirt, dust, oil, grease, asphalt and other foreign matter.
6. Chemical Hardener: Remove dirt, dust, oil, grease, asphalt, paint and other foreign matter from the concrete surface. Damp cure concrete, do not cure with curing compound. Apply hardener using 3 coats allowing 24 hours between coats. Apply first coat at 1/3 strength, second coat at 1/2 strength and final coat at 2/3 strength. Use manufacturer's recommended application rates. After final coat is dry, remove surplus hardener by scrubbing and mopping with water.
7. Finishes for exterior concrete paving construction are specified in Section 32 13 13.

3.7 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations:
 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 2. Construct concrete bases 4 inches high unless otherwise indicated, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 3. Minimum Compressive Strength: As indicated.
 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
 6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.8 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly deposited concrete from premature drying and excessively hot or cold temperatures, and maintain without drying at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete.
- B. Initial Curing: Initial curing shall immediately follow the finishing operation. Keep concrete continuously moist at least overnight. Use one of the following materials or methods:
 - 1. Ponding or continuous sprinkling.
 - 2. Absorptive mat or fabric kept continuously wet.
 - 3. Sand or other covering kept continuously wet.
 - 4. Curing Compounds: Apply compounds in accordance with the recommendations of the manufacturer.
 - a. On floors indicated to receive sealer, apply curing sealer.
 - b. Where possible, do not use curing compounds on surfaces indicated to receive ceramic tile, bonded terrazzo, cementitious floor toppings, liquid or trowel applied flooring, adhesively applied resilient flooring or carpet, paint, anti-graffiti coatings, or similar products required to be adhered to the concrete surface. Where necessary, apply non-film forming compound, or dissipating resin compound. If dissipating resin type compound is used, concrete surfaces shall be tested to ensure complete dissipation before application of bonded materials. If residual compound is found, the residual compound shall be removed by sandblasting, bead blasting, or chemical scrubbing.
 - c. On architectural concrete, use clear, non-yellowing compound.
 - d. On all other concrete surfaces, use dissipating resin compound.
- C. Cure surfaces to receive resilient flooring and ceramic tile by covering with waterproof paper coverings.
- D. Final Curing: Immediately following the initial curing and before the concrete has dried, accomplish additional curing by one of the following materials or methods:
 - 1. Continuing the method used in initial curing.
 - 2. Waterproof paper covering.
 - 3. Other moisture-retaining coverings as approved.
- E. Duration of Curing: Continue the final curing until the cumulative number of days or fractions thereof, not necessarily consecutive, during which temperature of the air in contact with the concrete is below 50 degrees F has totaled 7 days. If high early strength of concrete has been used, continue the final curing for a total of 3 days. Rapid drying at the end of the curing period shall be prevented.
- F. Formed Surfaces: Keep steel forms heated by the sun and all wood forms in contact with the concrete during the final curing period wet. If forms are to be removed during the curing period, immediately employ one of the above curing materials or methods. Continue such curing for the remainder of the curing period.
- G. Protection from Mechanical Injury: During the curing period, protect the concrete from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration. Protect finished concrete surfaces from damage caused by construction

equipment, materials, or methods, and by rain or running water. Self-supporting structures shall not be loaded in such a way as to overstress the concrete.

3.9 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Any concrete which is not formed as shown on the drawings, or for any reason is out of alignment, or is not true, or is not plumb or level, or is not in plane, or shows a defective surface, or is otherwise not in true and continuous form or is structurally defective, shall be considered as not conforming with the intent of this specification.
- C. Contractor shall remove such concrete from the job and replace with new work, at no extra cost to the Owner, unless Architect grants permission to patch defective area in accordance with the following procedures. Do not consider permission to patch any such area as a waiver of Architect's right to require complete removal of defective work if patching does not, in his opinion, satisfactorily produce or restore required quality and appearance of surface. Defects impairing strength of concrete will require special repairs or removal as directed by the Architect.
- D. Patching Appearance Defects:
 - 1. Inspection: After removing entire formwork assemblies, inspect concrete surfaces and patch tie holes, pour joints, voids, stone pockets, and such other defective areas as are permitted by Architect to be patched.
 - 2. Procedure: Where necessary, chip away defective areas to depth of not less than 1-inch with edges perpendicular to surface, with no feather edges. Wet area to be patched and a space at least 6-inches wide entirely surrounding it, to prevent absorption of water from patching mortar. Place grout of equal parts portland cement and sand with sufficient water to produce a brushing consistency. Brush well into surface, and then follow immediately with patching mortar.
 - 3. Use patching mortar of same material and of approximately same proportions as used for concrete, except omit coarse aggregate, and do not mix richer than 1 part cement to 3 parts sand. Use as little mixing water as is consistent with requirements of handling and placing.
 - 4. Compact mortar into place and screed off so as to leave patch slightly higher than surrounding surface. Then leave patch undisturbed for a period of 1 to 2 hours to permit initial shrinkage before being finally finished. Finish the patch in such a manner as to match adjoining surface, after striking off the patch with a straightedge spanning the patch and held parallel to direction of form marks.
- E. Patching Structural Defects: Special repairs, or removal and replacement, as directed by the Architect.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.10 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports. Owner's testing and inspecting agency to provide tests and inspections in accordance with CCR, T24, Sec. 1913A.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 50 cu. yd. of concrete or fraction thereof, or not less than once for each 2,000 square feet of surface area for slabs or walls, of each concrete mixture placed each day, per 2016 CBC 1905A.1.2.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
9. Test results shall be reported in writing to Architect, IOR, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

3.11 DEFECTIVE WORK

- A. Remove and replace defective concrete construction at Contractor's expense.

END OF SECTION

06/08/18

SECTION 03 35 43

POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Polished concrete finish in accordance with specified requirements to produce:
 - a. Aggregate Exposure: B.
 - b. Concrete Appearance: 2.

B. Related Sections:

1. Division 01: Administrative, procedural, and temporary work requirements.
2. Section 03 33 00 - Cast-In-Place Concrete.

1.2 REFERENCES

A. American National Standards Institute (www.ansi.org):

1. B101.3 -Test Method for Measuring Wet DCOF of Common Hard Surface Floor Materials.

B. ASTM International (www.astm.org):

1. D4039 – Standard Test method for Reflection Haze of High-Gloss Surfaces
2. D523 – Standard Test Method for Specular Gloss
3. D5767 – Standard Test method for Instrumental Measurement of Distinctness-of-Image (DOI) Glass of Coated Surfaces

C. Terminology: Concrete Polishing Council's glossary (www.ascconline.org)

1. Definitions.
2. Aggregate Exposure Chart.
3. Concrete Appearance Chart.

1.3 SUBMITTALS

A. Action Submittals:

1. Product Data: Manufacturer's descriptive data for the following:
 - a. Cleaner.
 - b. Densifier.
 - c. Protector.
2. Manufacturer's approval of applicator certificate. Pre-concrete finishing conference meeting notes.
3. Post-installation testing results:
 - a. ASTM D5767 - Distinctness-of-Image, percentage.
 - b. ASTM D523 - Standard Test Method for Specular Gloss.

B. Sustainable Design Submittals:

1. Low-Emitting per California Department Public Health Standard Method, Section 01350.

C. Close Out Submittals:

1. Operation and Maintenance information:
 - a. Cleaning and servicing data.
 - b. Provide 1-gallon of cleaner.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:

1. Minimum 5 years documented experience in work of this Section.
2. Accepted by Manufacturer.

B. Manufacturer:

1. Minimum 5 years documented experience in producing concrete materials.
2. Materials meet third party compliance with Low-Emitting per California Department Public Health Standard Method, Section 01350.

C. Mock- Up Approval Conference:

1. Schedule: Four (4) weeks prior to installation.
2. Size: 100 square feet
3. Location: Area subjected to direct and indirect sunlight
4. Attendance: Owner, Architect, Polishing installer, General Contractor, and Construction Manager.
5. Review and discuss installed mock-up and the following for approval:
 - a. Interior environmental requirements.
 - b. Review submittal samples.
 - c. Review aggregate exposure and appearance requirements.
 - d. ASTM D5767 - Distinctness-of-Image requirements.
 - e. ASTM D4039 - Reflection Haze of High-Gloss Surfaces requirements.
 - f. Staging and sequencing.
 - g. Protection of completed work.
6. Mockup may remain as part of the Work when approved by Architect.

1.5 PROJECT CONDITIONS

A. Prohibit concrete surfaces from the following prior to and after application process:

1. Vehicular traffic and pipe cutting operations in, around and above surfaces.
2. Storage of wood, ferrous metals, plastic, or any other materials to prevent damage.
3. Liquid drippings, sprinkler discharge and sprinkler testing on surfaces.
4. Chemical storage, acids and acidic detergents.
5. Prevent painting over surfaces without 100% floor protection from overspray.
6. Diaper all hydraulic lines of equipment that must enter polished floor spaces.

B. Maintain interior room conditions of 50 and 90 degrees F.

C. Ventilate areas to promote proper curing of components.

D. Restrict trade traffic from work areas during and after application process.

1.6 MAINTENANCE

- A. Deliver 1-gallon of cleaner and maintenance instructions to Owner at substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable:
 - 1. Lythic by Solomon Colors; (www.lythic.com)
- B. Substitutions: Section 01 25 13 – Product Options and Substitutions.

2.2 MATERIALS

- A. Surface Cleaner: Water-based, colloidal silica blended surfactant, silica dust reducer.
 - 1. Source: Lythic Cleaner by Solomon Colors.
 - 2. VOC Content: 10 grams per liter, maximum.
 - 3. pH Level: 10.0pH, non-hazardous waste per EPA requirements.
- B. Hardener and Densifier: Water-based, colloidal silica, odorless, penetrating hardener.
 - 1. Source: Lythic Densifier & XL by Lythic.
 - 2. VOC Content: 50 grams per liter, maximum.
 - 3. pH level: 10.0pH or less, non-hazardous waste per EPA requirements.
- C. Protector: Water-based, penetrating film forming protector, colloidal-silica co-polymer acrylic.
 - 1. Source: Protector by Lythic.
 - 2. VOC Content: 25 grams per liter, maximum

2.3 ACCESSORIES

- A. Crack and Joint Treatment: Polyurea-based joint filler by one of the following:
 - 1. Metzger McGuire: www.metzgermcguire.com
 - 2. SealBoss: www.sealboss.com
- B. Spall, Surface Defect and Resin Grout Material: Epoxy- Polyurea-based material by one of the following:
 - 1. Quick Mender by VersaFlex; www.versaflex.com
 - 2. TX3 by Hi-Tech Systems; www.hitechpolyurea.com
 - 3. Match Patch Pro; www.matchpatchpro.com
- C. Cementitious Grout: Unsanded, fast curing, hydraulic cement-based floor material by one of the following:
 - 1. Rapid Set Skim Coat by CTS Cement; www.ctscements.com
- D. Temporary Protection: Seamless, spill, stain and water-resistant sheeting.

1. Ramboard; www.ramboard.com

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrate with installer present for conditions affecting work performance of finish.
- B. Installation deems acceptance of on-site conditions.

3.2 PREPARATION

- A. Clean concrete surface of contaminants and repair imperfections to match adjacent surfaces.
- B. Protect equipment and previously installed finished from process.
- C. Clean concrete of contaminants to expose absorbent layers to produce specified aggregate exposure.

3.3 APPLICATION

- A. Provide gloss and aggregate exposure requirements in accordance to Concrete Polishing Council terminology.
- B. Verify mock-up has been approved prior to starting work.
- C. Apply spall, surface defect, crack and joint treatment and grout material to achieve a uniform surface appearance.
- D. Perform required process to achieve approved aggregate exposure and appearance in accordance with the following:

Aggregate Exposure Chart			
Class	Name	Approximate Surface Cut Depth*	Appearance
A	Cream	Very Little	Minimum exposure of fine aggregates or sands. High floor flatness (FF) requirement is critical to achieving uniform appearance
B	Fine Aggregate (Salt and Pepper)	1/16 inch	Fine aggregate exposure with little or no medium aggregate exposure at random locations.
C	Medium Aggregate	1/8 inch	Medium aggregate exposure with little or no large aggregate exposure.
D	Large Aggregate	1/4 inch	Large aggregate exposure with little or no fine aggregate exposure
*Substrate mix design, finish and flatness will affect the appearance			

Finished Gloss Chart						
Level	Name	Reflective Clarity		Reflective Sheen	Gloss Reading	Grit
1	Flat (Ground)	Flat appearance with no to very slight diffused reflection	0 - 10	None to very low	n/a	100
2	Satin (Honed)	Images of objects being reflected have a matte appearance.	10 - 25	Low to medium	40 - 49	100-400
3	Polished	Images of objects being reflected do not have a sharp and crisp appearance but can be easily identified.	25 - 45	Medium to high	50 -59	400-800
4	Highly Polished	Images of objects being reflected do not have a sharp and crisp as would be seen in a near-mirror like reflection. Grouting material required.	45 - 100	High to highest	60-80 and above	800 and higher

E. Protector:

1. Apply in accordance with manufacturer's instructions.
2. Burnish to produce maximum appearance and protection repellency properties.

3.4 FIELD QUALITY CONTROL

A. Measure slip resistance in accordance with ANSI B101.3 -Test Method for Measuring Wet Dynamic Coefficient of Friction (DCOF) of Common Hard Surface Floor Materials.

1. Results of 0.60 dry in accordance with Americans with Disabilities Act (ADA) and Occupational Safety and Health Administration (OSHA).

B. Final Floor Testing:

1. Perform five (5) of the following surface tests at various locations:
 - a. ASTM D5767 - Distinctness-of-Image.
 - b. ASTM D523 - Standard Test Method for Specular Gloss.
2. Do not proceed with sealer and water repellant protector application until floors pass testing.
3. Final floors to be smooth with no scratches in polish finish during inspection prior to sealer and water repellant application.

3.5 PROTECTION

- A. Allow floors to dry and cover with manufacturer approved non-staining, temporary protection.

END OF SECTION

06/06/18

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Structural steel construction.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Requirements:
 - 1. Section 05 50 00 "Metal Fabrications" for miscellaneous steel fabrications and other steel items not defined as structural steel.

1.2 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- B. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.3 REFERENCES

- A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the structural steel only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

American Institute of Steel Construction (AISC)
American Society for Testing and Materials (ASTM International)
American Welding Society (AWS)
The Society for Protective Coatings (SSPC)
Research Council on Riveted and Bolted Joints (RCRBJ)

1.4 COORDINATION

- A. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 ACTION SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's certification for bolts, nuts, washers, filler material for welding, primer and non-shrink grout.

- B. Shop Drawings: Submit shop and erection drawings for review. Review of drawings will cover only the general scheme, design, and character of the details, but not the checking of dimensions nor will such review relieve the Contractor from responsibility for executing the construction in accordance with the contract documents.
1. Field Measurements: Before starting construction or proceeding with shop and erection drawings, verify measurements, lines, grades, elevations, locations and details of existing field conditions and be responsible for correctness, conformity, accuracy and execution of structural steel construction to conform to actual conditions.
 2. Detailing: Detail in conformance with the AISC Manual "Structural Steel Detailing", except where otherwise indicated.
 3. Field Connections: Clearly show field connections on the erection drawings with complete details as required so that the connections can be made without reference to the design drawings.
 4. Provide setting drawings, templates, and directions for installation of anchor bolt and other anchorages to be installed under other sections.
 5. Dimensions and Locations: Obtain exact dimensions and locations of all proprietary or manufactured items and equipment (HVAC gear, skylights, hatches, etc.) that affect structural steel members. Coordinate all such data and incorporate into shop drawings.
- C. Submittal procedures and quantities are specified in Section 01 33 00.

1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- C. Submit mill test certificates for mill order steel which can be identified readily by means of heat or melt numbers marked at the mill and for which continuity of such identification can be maintained at the place of fabrication to the satisfaction of the testing agency. Such steel need not be tested as specified in Section 01 45 00.

1.7 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify welding procedures and welding operators in accordance with AWS D1.1, "Structural Welding Code - Steel." Provide certifications that welders to be employed have satisfactorily passed AWS qualification tests. If recertification of welders is required, retesting will be the Contractor's responsibility.
- B. Regulatory Requirements:
1. Except as modified by the requirements indicated or specified herein, structural steel construction shall conform to the 2016 California Building Code (CBC) Title 24 Part 2, Chapter 22A - Steel.
 2. CalGreen Requirements: Coating and repair materials shall comply with environmental requirements of 2016 California Building Code (CBC) Title 24 Part 11.

- a. The quantity of volatile organic compounds (VOC) used in materials shall not exceed the limits permitted under the current regulations for architectural coatings of the Bay Area Air Quality Management District.

1.8 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver material in time to insure uninterrupted progress of the construction.
- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- C. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 - 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 - 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Use only new and undamaged materials. Steel that in the opinion of the Inspector is badly corroded or physically damaged shall not be incorporated in the construction.

2.2 STRUCTURAL STEEL MATERIALS

- A. Structural Steel, Angles, Channels, Miscellaneous Channels, Bars and Plates: ASTM A36.
- B. Cold-Formed Hollow Structural Sections: (HSS, Square and Round): ASTM A500, Grade B.
- C. Filler Metal for Welding: Meet the requirements of AWS D1.1. Electrodes shall be as recommended by their manufacturers for the position and other conditions of actual use. Electrodes shall be E70 series.

2.3 BOLTS, CONNECTORS, AND ANCHORS

- A. Common Machine Bolts and Anchor Bolts: ASTM A307, Grade A. Nuts shall conform to ASTM A563, Hex Grade A.
- B. Welded, Threaded Stud Anchors: ASTM A36.
- C. Anchor Bolts, Pins and Rods: ASTM F1554 (grade as indicated), ASTM A307, A36, or A283, Grade D.

2.4 PRIMER

- A. Galvanizing Repair Compound: High zinc dust content galvanizing repair paint conforming to ASTM A780 or hot applied zinc rich material. Acceptable products or equal:

American Solder & Flux; Drygalv
Kenco Div.; Galvicon
Metalloy Products Co.; Galvaloy

2.5 GROUT

- A. Metallic, Shrinkage-Resistant Grout: For grout in concealed locations use premixed factory packaged, ferrous aggregate, grouting compound meeting the requirements of ASTM C1107. Acceptable products or equal:

Gifford-Hill & Co., Inc.; Supreme Plus
Master Builders; Embeco 636
Sonneborn Building Products; Ferrolith G-DS

- B. Nonmetallic, Shrinkage-Resistant Grout: For grout in exposed to view locations use premixed, nonmetallic, non-corrosive, non-staining grouting compound containing silica sands, portland cement, shrinkage compensating agents and water reducing agents, meeting the requirements of ASTM C1107. Acceptable products or equal:

Gifford Hill & Co., Inc.; Supreme
Master Builders; Masterflow 713
The Upco Company; Upcon Nonshrink

2.6 FABRICATION

- A. General: Fabricate and assemble materials in the shop to the greatest extent possible. Shearing, flame cutting, and chipping shall be done carefully and accurately. Coordinate connection details where steel attaches to concrete. Verify lines, levels, and dimensions, where possible, just before commencing fabrication of connection details. Correct construction that does not fit. Schedule and coordinate construction under this section with that specified elsewhere. When not otherwise indicated or specified, comply with applicable requirements of AISC "Specifications for Design, Fabrication and Erection of Structural Steel for Buildings".
- B. Exposed Steel Work: Where steel surfaces are exposed to view in the finished construction, use only materials that are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness. Remove such blemishes by grinding or by welding and grinding, before cleaning, treating and application of surface finishes.
- C. Connections: Bolt or weld connections as indicated. One sided or other types of eccentric connections will not be permitted unless shown in detail on the Contract Drawings. Where exposed, limit bolt projections beyond face of nuts to one-half inch.
1. Make welded connections in accordance with AWS D1.1. Assemble and weld built-up sections by methods that will produce true alignment of axes without warp.
 2. Grind and dress smooth welds exposed to view in the finished construction, so that the shape and profile of the item welded is preserved.
- D. Joints: Compression joints depending upon contact bearing shall have bearing surfaces truly milled perpendicular to their axis. Cut or dress other joints straight and true.

- E. Holes: Cut, drill, or punch holes at right angles to the surface of the metal. Do not enlarge holes by burning, however holes may be enlarged by careful reaming. Holes in base or bearing plates shall be drilled. Holes shall be provided in members to permit connecting the construction of other trades.
- F. Marking: Mark members for erection in accordance with shop drawings. Members weighing over 4 tons shall have the weight so marked on the member. Long members shall be loaded onto the trucks and so marked.

2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - 2. Surfaces to be field welded.
 - 3. Surfaces of high-strength bolted, slip-critical connections.
 - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 - 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.8 GALVANIZING

- A. General: All steel and ferrous metal items located on the exterior of the building, and otherwise specifically indicated to be galvanized, shall be galvanized by the hot-dip process, meeting the requirements of ASTM A123. All required hot-dip galvanizing shall be done after fabrication, in the largest sections possible. Items too large for available dip tanks shall be sprayed, by approved methods, with molten zinc to coating thickness of 0.003-inch to 0.004-inch.
 - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
- B. Coating Weight: Weight of the zinc coating per square foot of actual surface shall average not less than 2.0-ounces and no individual specimen shall show less than 1.8-ounces.
- C. Repair of Coating: Restore shop galvanized metal necessitating field soldering or welding which in any manner removes original galvanizing, by using galvanizing repair compound in accordance with the manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 - 1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Field Measurements and Templates: Secure field measurements required for proper and adequate fabrication and installation. Furnish templates not less than 14-gage, for each individual anchor bolt assembly with reference centerlines or working points clearly marked in order to locate all items to be embedded in concrete together with setting instructions required for installation.
- B. Temporary Shoring and Bracing: In accordance with CCR Title 8, design and provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are securely in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structure as erection proceeds. Design of such shoring and bracing is the Contractor's responsibility.
- C. Temporary Planking: Provide temporary planking as required by CCR Title 8 and as necessary to effectively complete the construction.

3.3 ERECTION

- A. Setting Base and Bearing Plates: After the supported members have been plumbed, aligned and properly positioned, set base and bearing plates. Support plates on adjustable bolt supports or shims until grout has set. Place non-shrink grout or drypack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Follow the grout manufacturer's instructions.
- B. Framing: Except as specified herein, erect framing in accordance with the AISC Code of Standard Practice for Steel Buildings and Bridges, latest edition, and CBC Title 24 Part 2. Plan and lay out framing so that cutting will not be required. Erect the construction plumb, square, and true to line, level, and position within tolerances established in the AISC referenced codes.
- C. Holding and Protection: In assembling and during welding, hold the component parts with jogs, clamps or other adequate means to keep parts straight and in close contact. In welding, take precautions to minimize "lock-up" stress and distortion due to heat. During windy conditions in the field perform welding only after adequate wind protection is furnished and set up.

3.4 FIELD CONNECTIONS

- A. Bolted Connections: Bolt field connections except where welding is indicated. Provide common bolted connections using a minimum of 5/8-inch diameter bolts for connections not indicated.

- B. Weld Connections: Comply with AWS D1.1/D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
- C. Camber: Inspect beams and girders in the shop for camber and align so that they are fabricated and erected with their camber turned upwards. Camber shall not exceed the requirements of the governing documents.
- D. On all structural steel construction, remove erection bolts, temporary welds, run-off plates and backing strips. Fill holes from erection bolts with plug welds and grind smooth.

3.5 FIELD INSPECTION AND TESTING

- A. Inspection and testing are specified in Section 01 45 00.
- B. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Verify structural-steel materials and inspect steel frame joint details.
 - 2. Verify weld materials and inspect welds.
 - 3. Verify connection materials and inspect high-strength bolted connections.
- C. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.
- B. Touchup Painting: Cleaning and touchup painting are specified in Section 09 91 00 "Painting."

3.7 AS ERECTED DRAWINGS

- A. After all steel has been erected, correct or revise the shop drawings and erection diagrams to correspond with the changes made in the field. Refer to requirements specified in Section 01 78 39.

END OF SECTION

06/08/18

SECTION 05 31 00

STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof deck.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1. Section 05 50 00 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
2. Section 09 91 00 "Painting" for field painting.

1.2 REFERENCES

A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the stone facing only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

American Institute of Steel Construction (AISC)
American Society for Testing and Materials (ASTM International)
American Welding Society (AWS)
Steel Deck Institute (SDI)
Underwriters Laboratories, Inc (UL)

B. Section Properties: Shall be computed in accordance with the American Iron and Steel Institute (AISI) Specification for the Design of Cold-Formed Steel Structural Members.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings: Submit shop, erection and placement drawings of floor and roof deck and shear studs. Include deck layout, framing and support of openings, dimensions and sections, details of accessories and type and location of welds.

1. Field Measurements: Before starting shop and erection drawings, verify measurements, lines, grades, elevations, locations and details of field conditions and be responsible for correctness, conformance, accuracy and execution of construction to conform to actual conditions.
2. Detail the construction in conformance with the AISC Structural Steel Detailing Manual, except where otherwise indicated.
3. Field Connections and Placement Diagrams: Show field connection and placement diagrams on the erection drawings with complete details, layouts and dimensions.

4. Changes: Minor, non-structural changes from the design drawings may be shown on the shop and erection drawings provided they are clearly indicated as such. Structural changes must have prior approval from the Architect and Division of the State Architect (DSA) Structural Safety Section (SSS).

C. Insurance Certification: Assist the Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance.

D. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 INFORMATIONAL SUBMITALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Evaluation Reports: For steel deck, from ICC-ES or IAPMO-ER.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify welding procedures and welding operators in accordance with AWS D1.3-2010, "Structural Welding Code – Sheet Steel." Provide certifications that welders to be employed in the construction have satisfactorily passed AWS qualification tests for light gage welding. If recertification of welders is required, retesting will be the Contractor's responsibility.

B. Welding: Shall comply with applicable provisions of American Welding Society (AWS) D1.3 Structural Welding Code - Sheet Steel.

C. Superimposed load and diaphragm shear capacities shall be computed in accordance with the requirements of the Steel Deck Institute (SDI).

D. Regulatory Requirements: Furnish and install metal deck in accordance with the manufacturer's current ICC-ES Evaluation Report and UL listing requirements to obtain diaphragm values and fire ratings indicated.

E. FM Global Listing: Provide metal roof deck units which have been evaluated by Factory Mutual System and are listed in "Factory Mutual Approval Guide" for "Class I" fire rated construction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

2.2 MATERIALS

- A. Galvanized-Steel Sheet for Deck Units:
 - 1. Roof Decking: ASTM A653, Structural Steel (SS), Grade 40, G-90 zinc coating.
- B. Steel for Accessories: ASTM A653, Grade C, coating designation G-90.
- C. Small Rolled Steel Shapes and Bars Used for Reinforcing Openings and Holes: ASTM A36.
- D. Welding Electrodes: Comply with AWS requirements, E70XX, Low Hydrogen.
- E. Fasteners: Hex head, stainless steel, self-drilling #12 or larger, with molded washer to create water tight and permanent seal. Pneutek fasteners required for fastening roof deck as indicated.
- F. Galvanizing Repair Compound: High zinc dust content galvanizing repair paint meeting the requirements of Mil. Spec DOD-P-21035A or hot applied zinc rich material. Acceptable products or equal:
 - American Solder & Flux; Drygalv
 - Kenco Div.; Galvicon
 - Metalloy Products Co.; Galvaloy
- G. Flexible Closure Strips: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.

2.3 ROOF DECK UNITS

- A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
 - 1. Standard Roof Deck: Short span narrow rib deck, 1-1/2 inches deep x 36 inches wide, of not lighter than 18 gage galvanized steel. Acceptable products or equal:
 - Basis-of-Design Product: Verco Manufacturing Co.; www.vercodeck.com; Type PLB-36, ASC Steel Deck.; www.ASCProfiles.com; Type B-36
 - 2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 40, G90 zinc coating.
 - 3. Deck Profile: As indicated.
 - 4. Profile Depth: 1-1/2 inches.
 - 5. Span Condition: As indicated.
 - 6. Design Uncoated-Steel Thickness: 0.0474-inch (18 gauge).
 - 7. Side Laps: Interlocking seam allowing connection with PunchLok® tool.

2.4 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

- B. Furnish accessories required to provide a complete installation including fillers for end panels, friction caps for closing shop fabricated access holes for welding, flashing at columns and closures for cell ends, roof and floor drain sumps, metal and neoprene partition closures, nonpenetrating hanger tabs, and other accessories required.
- C. Provide manufacturer's standard ridge plates, valley plates, transition plates, and closures as indicated on the structural drawings.
- D. Provide openings and reinforcement for openings noted specifically by the deck manufacturer on the structural drawings.
- E. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- F. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- G. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- H. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- I. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile indicated, or as recommended by SDI Publication No. 31 for overhang and slab depth.
- J. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- K. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- L. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.

2.4 FABRICATION

- A. Roof Deck: Manufacture deck units to lengths as indicated on shop drawings. Panel end conditions are to be butted or end-lapped, 2" minimum. Sidelaps are to be male/female interlocking type allowing connection with PunchLok® tool. Sidelaps are to be nestable or interlocking when using screw-type fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

3.3 ROOF-DECK INSTALLATION

- A. General: Install the metal deck and accessories in compliance with the manufacturer's written recommendations and approved shop drawings.
- B. Placing Metal Deck Units: Place metal deck units on supporting members and adjust to proper position. Ensure proper bearing on supporting members and accurate alignment of endlaps and sidelaps prior to permanently attaching units.
- C. Attachment of Metal Deck Units to Supports:
 - 1. Welded attachment of metal deck units to the supporting members shall conform to AWS D1.1 and D1.3. Welders shall be certified prior to commencing work. Attach metal deck units to supporting members with 3/4" effective diameter puddle welds.
 - 2. Weld Spacing: Space and locate welds as indicated.
- D. Connecting Sidelaps: Use Verco Steel Deck PunchLok® tool to create interlocking connection at spacing designated on the shop/erection drawings.
- E. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 - 1. End Joints: Lapped 2 inches minimum or butted at Contractor's option.
- F. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck. Space welds not more than 12 inches apart with at least one weld at each corner.
 - 1. Install reinforcing channels or zees in ribs to span between supports and weld.
- G. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

- H. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 AS ERECTED DRAWINGS

- A. After all steel decking has been erected, correct or revise the shop drawings erection and placement diagrams to correspond with the changes made in the field. Refer to requirements specified in Section 01 78 39.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field testing and inspection are specified in Section 01 45 00 "Quality Control."

3.6 PROTECTION

- A. Galvanizing Repairs: Repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

END OF SECTION

06/08/18

SECTION 05 40 00

COLD FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior non-load bearing wall framing.
2. Soffit framing.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Requirements:

1. Section 05 50 00 "Metal Fabrications" for miscellaneous steel shapes, and connections used with cold-formed metal framing.
2. Section 09 22 16 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies and furring systems for gypsum board ceilings and soffits.
3. Section 09 51 13 "Acoustical Panel Ceilings" for suspension systems for acoustical ceilings.

1.2 REFERENCES

A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the stone facing only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

B. American Iron and Steel Institute (AISI) www.steel.org:

1. Specification for the Design of Cold-Formed Steel Structural Members.

C. American Society of Civil Engineers (ASCE) www.asce.org

1. Minimum Design Loads for Buildings and Other Structures.

D. American Welding Society (AWS) www.aws.org

1. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel.

E. ASTM International (ASTM) www.astm.org:

1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
3. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
4. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Board and Metal Plaster Bases.

5. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.
 6. C1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
- F. Steel Stud Manufacturer's Association (SSMA) (www.ssma.com):
1. SSMA - Member Directory.
- G. Society for Protective Coatings (SSPC) www.sspc.org:
1. SSPC - Painting Manual.

1.3 ACTION SUBMITTALS

- A. Product Data: Submit framing manufacturer's literature, including a current ICC Evaluation Report, showing tabulation of structural properties, load capacities, dimensions, metal gages and type of coating for all framing and furring members.
- B. Shop Drawings:
1. Submit shop drawings for wall, partition, and soffit framing systems and special assemblies where the design is not indicated.
 2. Show layout, size, gage and cross sections and spacing of framing members; connections including welding procedures and electrodes; and supplemental strapping, bridging, lateral bracing, accessories, and details required for proper installation.
 3. Furnish layout of required clips or slots to the metal deck installer well in advance of deck installation.
- C. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding Certificates.
- B. Research / Evaluation Reports: For cold-formed steel framing, post-installed anchors, and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- B. Regulatory Requirements: Furnish and install wall framing and powder driven fasteners in accordance with 2016 CBC Chapter 22A, and the framing and fastener manufacturer's current ICC Evaluation Reports.
- C. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- D. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel

Stud Association, the Steel Framing Industry Association, or the Steel Stud Manufacturers Association.

E. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code - Steel."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."

F. AISI Specifications and Standards: Comply with:

1. AISI S100 "North American Specification for the Design of Cold-Formed Steel Structural Members".
2. AISI S200 "North American Standard for Cold-Formed Steel Framing – General Provisions".
3. AISI S201 "North American Standard for Cold-Formed Steel Framing – Product Standard".
4. AISI S211 "North American Standard for Cold-Formed Steel Framing – Wall Stud Design".
5. AISI S212 "North American Standard for Cold-Formed Steel Framing – Header Design".
6. AISI S213 "North American Standard for Cold-Formed Steel Framing – Lateral Design".
7. AISI "Code of Standard Practice for Cold-Formed Steel Structural Framing".

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the project site and store them in adequately ventilated dry locations. If it is necessary to store materials outside, stack them off the ground on a platform and fully protected from the weather.
- B. Protect and store cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling as required in AISI's "Code of Standard Practice".
- C. Comply with ASTM C1007.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Provide products by one of the following:

1. SCAFCO Steel Stud Company; www.scafco.com; ICC-ESR-3064P; (Basis-of-Design).
2. ClarkDietrich Building Systems; www.clarkdietrich.com; ICC-ESR-1166P and ESR-2457.
3. Or equal.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
1. Design Loads: As indicated on Drawings.

2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height.
 - b. Ceiling/Soffit Joist Framing: Vertical deflection of 1/360 of the span for live loads and 1/240 for total loads of the span.
 3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of 1 inch.
 5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- B. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:
1. Wall Studs: AISI S211.
 2. Headers: AISI S212.
 3. Lateral Design: AISI S213.

2.3 COLD-FORMED STEEL FRAMING MATERIALS, GENERAL

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than **25** percent.
- B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
1. Grade: ST33H for 18 gauge and lighter, and ST50H for 16 gauge and heavier.
 2. Coating: G60.

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 54-mil (16 gauge).
 2. Flange Width: 1-5/8 inches, minimum.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 54-mil (16 gauge), unless noted otherwise.
 2. Flange Width: 1-1/4 inches.

2.5 SOFFIT FRAMING

- A. Exterior Soffit Framing: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 54-mil (16 gauge).
 - 2. Flange Width: 1-5/8 inches, unless otherwise indicated.

2.6 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A1003, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration and as determined by performance requirements specified, unless otherwise indicated, as follows:
 - 1. Supplementary framing.
 - 2. Bracing, bridging, and solid blocking.
 - 3. Web stiffeners.
 - 4. Anchor clips.
 - 5. End clips.
 - 6. Foundation clips.
 - 7. Gusset plates.
 - 8. Stud kickers and knee braces.
 - 9. Joist hangers and end closures.
 - 10. Hole reinforcing plates.
 - 11. Backer plates.
- C. U-Channel: Cold Rolled Channel (CRC) Manufacturer's standard length U-Channel for lateral bracing for exterior curtain wall framing, load bearing walls, or high interior partitions construction of structural studs.
 - 1. Manufacturer: SCAFCO Steel Stud Company: Cold Rolled Channel (U).
 - 2. Or equal.

2.7 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36, zinc coated by hot-dip process according to ASTM A123.
- B. Anchor Bolts: ASTM F1554 Grade 36, threaded carbon-steel and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.

Hilti Corp.; Kwik Bolt-TZ; ICC Report ESR-1917; or equal.

- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

Hilti Corp.; X-U Fastener; ICC Report ESR-2269; or equal.
ITW/Ramset/Red Head; ICC Report ESR -1147; or equal

- E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS requirements. ASTM electrode classification A233 E60, or type required for materials being welded.
- G. Screws: No. 8 by 3/8-inch cadmium or zinc coated TEKS screws with pan heads.
- H. Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft temper.
- I. Concrete inserts, expansion anchors, powder driven fasteners, flange clips, and bolts for attachment of hanger wires to overhead construction shall have a rated capacity equal to that of the hanger wire.

2.8 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20. High zinc dust content galvanizing repair paint meeting the requirements of ASTM A780 or hot applied zinc rich material. Acceptable products or equal:
 - American Solder & Flux; Drygalv
 - Kenco Div.; Galvicon
 - Metalloy Products Co.; Galvalloy
- B. Cement Grout: Portland cement, ASTM C150, Type I; and clean, natural sand, ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C1107, with fluid consistency and 30-minute working time.
- D. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.9 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

- b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.
- 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: In accordance with ASTM C955. Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.
- D. Backing Plates: Steel, 3/16 inch thick, of proper size to accommodate fastenings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. General: Conform to rules and practices set forth in the CBC Title 24 Part 2 and AISI "Specifications for Design for Cold Formed Steel Structural Members," and with the manufacturer's printed instructions and recommendations, as applicable.
- B. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- C. Install cold-formed steel framing according to AISI S200, AISI S202, and to manufacturer's written instructions unless more stringent requirements are indicated.

- D. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
 - E. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
 - F. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
 - G. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
 - H. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
 - I. Install insulation, specified in Section 07 21 00, in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
 - J. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- 3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION
- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
 - 1. Secure runner tracks as recommended by the stud manufacturer in ICC Evaluation Report. Provide fasteners at all corners and ends of runner tracks.
 - B. Fasten both flanges of studs to bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: 16 inches, unless otherwise indicated.
 - C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
 - D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.

2. Connect vertical deflection clips to infill studs and anchor to building structure, where shown on drawings.
 3. Connect drift clips to cold-formed metal framing and anchor to building structure, where shown on drawings.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection. Provide one of the following options:
1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 CEILING AND SOFFIT JOIST INSTALLATION

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.
- B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
 2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.
- C. Space joists not more than 2 inches from abutting walls, and as follows:
1. Joist Spacing: 16 inches, unless otherwise indicated.
- D. Frame openings with built-up joist headers consisting of joist and joist track, or another combination of connected joists if indicated.
- E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated.
1. Install web stiffeners to transfer axial loads of walls above.
- F. Install bridging at intervals indicated. Fasten bridging at each joist intersection as follows:
1. Combination Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.
- G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
- H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.6 ERECTION TOLERANCES

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.7 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780, Annex A2 (Repair Using Paints Containing Zinc Dust), and manufacturer's written instructions.
- B. Touch up abrasions, burns, and welding, including construction activities of other trades, with primers for primed steel or with approved galvanizing compound if galvanized. Remove oil, grease, rust, loose scale, loose coatings, weld slag and other deleterious material before touch-up.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

06/06/18

SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Work includes, but is not limited to, the following:
 - 1. Steel framing and supports for countertops.
 - 2. Steel pipe side rails at drinking fountains.
 - 3. Steel pipe downspouts.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Products furnished, but not installed, under this Section include the following:
 - 1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete.
 - 2. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
- D. Related Requirements:
 - 1. Section 05 12 00 "Structural Steel Framing."

1.2 REFERENCES

- A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.
 - American National Standards Institute (ANSI)
 - American Institute of Steel Construction (AISC)
 - ASTM International (ASTM)
 - American Welding Society (AWS)
 - National Association of Architectural Metal Manufacturer's (NAAMM)

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's specifications, anchor details and installation instructions for products used in miscellaneous metal fabrications, including the following:
 - 1. Paint products.
 - 2. Downspout boots.
 - 3. Grout.
- B. Shop Drawings:
 - 1. Submit shop drawings of miscellaneous metal work giving sizes, details of fabrication and construction, methods of assembly and bracing, and locations of hardware, anchors, and accessories.
 - 2. Include shop and erection details, including cuts, copes, connections, holes, bolts and welds. Indicate welds, both shop and field, by standard welding symbols in AWS D1.1. Show the size, length and type of each weld. All materials to be brazed or soldered shall have connections indicated by symbols that are industry standards.
 - 3. Contractor shall be responsible for all fabrication and for correct fitting of metal members shown on shop drawings.
 - 4. Provide Shop Drawings for the following:
 - a. Steel framing and supports for countertops.
 - b.
 - c. Steel pipe side rails at drinking fountains.
 - d. Steel pipe downspouts.
- C. Submittal procedures and quantities are specified in Section 01 33 00.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- C. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."
- B. Regulatory Requirements: Provide products meeting the accessibility requirements of the 2016 California Building Code (CBC) Title 24 Part 2 Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings and Publicly Funded Housing; and 2010 ADA Standards for Accessible Design.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver material in time to ensure uninterrupted progress of the work.

- B. Store materials in a manner to preclude damage and permit ready access for inspection and identification of each shipment. Store steel materials, either plain or fabricated, above the ground upon platforms, pallets, skids, or other supports.
- C. Keep materials free from dirt, grease, and other foreign matter, and protect from corrosion. Material showing evidence of damage will be rejected; immediately remove rejected materials from the work.

1.8 FIELD MEASUREMENTS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36.
- C. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- D. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- E. Pipe Sleeves: Pipe sleeves through concrete walls and footings shall be standard weight, wrought iron, mild steel, or cast iron sleeves with not less than 1/2-inch space all around between the sleeve and pipe.

2.2 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening aluminum.
 - 2. Provide stainless-steel fasteners for fastening stainless steel.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1 for Type 304 stainless steel, and Group 2 for Type 316L stainless steel.
- D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

- E. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
- F. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- G. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593), and nuts, ASTM F 594.

2.3 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Shop Primer:
 - 1. Exterior Handrails and Railings: High-build epoxy-polyamide primer. Acceptable products or equal:
 - Carboline Co.; No. 893
 - Rust-O-Leum Corp.; No. HS 9369
 - The Sherwin Williams Co.; No. B67 H 5/V 5
 - Tnemec Co., Inc.; Epoxoline 66-1211
 - 2. All Other Steel Surfaces: Fast curing, lead and chromate free, modified alkyd primer. Acceptable products or equal:
 - Carboline Co.; No. GP-20 or GP-818
 - Rust-O-Leum Corp.; No. 678 or 7669
 - The Sherwin Williams Co.; No. B50 N 2 or B50N Z 6
 - Tnemec Co., Inc.; 10-99 or P10-99
- D. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- F. Quick Setting Hydraulic Cement: Acceptable products or equal:
 - The Burke Co.; Burke Plug
 - Minwax Construction Products Div.; Super Por-Rok
 - Tamms Industries Co.; Tammstech Rapid Rock
 - Master Builders; Masterflow 713

- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.
- H. Nonshrink, Nonmetallic, Grout: For grout in exposed to view locations use premixed, nonmetallic, non-corrosive, non-staining grouting compound containing silica sands, portland cement, shrinkage compensating agents and water reducing agents, meeting the requirements of ASTM C1107. Acceptable products or equal:

Gifford Hill & Co., Inc.; Supreme
Master Builders; Masterflow 713
The Upco Company; Upcon Nonshrink

2.4 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 - 1. Where units are indicated to be cast into concrete, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2.6 COUNTERTOP SUPPORTS

- A. Fabricate counter supports of welded steel angles of sizes and shapes indicated. Grind exposed welds smooth. Provide complete with attachments to framing and counters. Countertops are specified in Section 06 41 16.

2.7 STEEL PIPE SIDE RAILS AT DRINKING FOUNTAINS

- A. Fabricate side rails of steel pipe of sizes indicated.
- B. Join vertical posts and horizontal rails by fitting posts to top rails, fitting intermediate rails to posts, groove welding joints and grinding smooth.
- C. Shop-fabricate side rails.
- D. Hot-dip galvanize exterior side rails at drinking fountains.

2.8 STEEL PIPE DOWNSPOUTS

- A. Fabricate downspouts from galvanized, Schedule 40 steel pipe of sizes indicated. Weld joints and grind smooth. Hold downspouts in position 1-1/2 inch clear of cement plaster walls; and 1-1/2" clear of steel columns; with galvanized steel bar tabs spacing as shown, and securely fasten to the wall or steel column.
- B. Outlet: Vertical, to discharge into downspout boot.

2.9 METAL DOWNSPOUT BOOTS

- A. Provide downspout boots made from cast iron in heights indicated with inlets of size and shape to suit downspouts. Provide units with flanges and holes for countersunk anchor bolts.
 - 1. Basis-of-Design Product: Jay R. Smith Co.; 4530 Series-Can. Duco Cast Iron Cleanout Tee and Countersunk Plug with Stainless Steel Round Cover and Vandal-Proof Screw, and NO-HUB Both Ends.
 - 2. Outlet: Vertical, to discharge into pipe.
- B. Prime cast-iron downspout boots with zinc-rich primer.

2.10 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.

- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.11 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, or unless otherwise indicated.
 - 1. Shop prime with primers specified in Article 2.3.
- D. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Steel and miscellaneous metal work shall conform to the applicable requirements of the referenced "Codes and Standards". Details indicated are typical, similar details apply to similar conditions.
- B. Check drawings for dimensions, elevation, size, and locations of installations.
- C. Supply miscellaneous metal items in ample time for incorporation in the work.
- D. Include reinforcing angles, plates, straps, brackets, hangers, clips, lugs, holes, sleeves, shims, other hardware as indicated or required for erection of steel and miscellaneous metal work and as required to complete the work as indicated.

3.2 WELDED CONNECTIONS

- A. Welders shall be certified qualified welders. Welders welding light gage metal shall be qualified for light gage metal welding.
- B. Welded connections shall be made in accordance with AWS D1.1. Perform welding in the shop unless otherwise indicated or specified.

- C. All welds and other connections exposed in the finished work shall be ground and dressed smooth and so that the shape and profile of the item welded is preserved.

3.3 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.4 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Install miscellaneous metal items as rapidly as the progress of other work will permit. Make splices and field connections with bolts, except where welding or brazing is indicated or approved on the shop drawings. Install fasteners as specified herein.
- C. Set metal work accurately at the established lines and levels. Install work in strict accordance with approved drawings and actual conditions, true and horizontal or perpendicular as the case may be, level and square with angles and edges parallel with related lines of the building.
- D. Anchor bolts, anchors, block-outs and sleeves shall be properly located and built into connecting work. Bolts and anchors shall be preset by the use of templates or such other methods as may be required to locate the anchors and anchor bolts accurately.
- E. After assembly, the various members forming parts of a completed frame shall be aligned and adjusted accurately before being fastened. Tolerances shall conform to the applicable requirements of AISC "Code of Standard Practice". Contact shall be cleaned before the members are assembled. Poor matching of holes shall be corrected by drilling to the next larger size.

3.5 INSTALLING STEEL PIPE SIDE RAILS AT DRINKING FOUNTAINS

- A. Steel Pipe Side Rails: Install railings in concrete by means of pipe sleeve inserts set and anchored in the concrete. Insert posts into pipe sleeves, plumb and align. Fill the annular space between pipe posts and sleeve inserts with quick setting hydraulic cement.

3.6 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2-mil dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

END OF SECTION

06/08/18

SECTION 06 10 53

MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rooftop support curbs.
2. Wood blocking, cants, and nailers.
3. Plywood backing panels.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Requirements:

1. Section 06 16 00 "Sheathing" for plywood sheathing.

1.2 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.

1.3 REFERENCES

A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

APA-The Engineered Wood Association (APA)
American Society for Testing and Materials (ASTM International)
American Wood-Preservers' Association (AWPA)
Redwood Inspection Service (RIS)
U.S. Department of Commerce Product Standard (PS)
West Coast Lumber Inspection Bureau (WCLIB)
Western Wood Products Association (WWPA)

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Power-driven fasteners.
3. Post-installed anchors.
4. Metal framing anchors.

1.6 DELIVERY, STORAGE, AND HANDLING

- ### A.
- Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- ### A.
- Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber:

1. Untreated Lumber: Maximum 19 percent except 25 percent for timbers 5" by 5" in size or larger.
2. Treated Lumber: Maximum 19 percent, except 23 percent for timbers 5" by 5" in size or larger, after pressure treatment.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- ### A.
- Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with ground, and Use Category UC3b for exterior construction not in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

- ### B.
- Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat all miscellaneous carpentry unless otherwise indicated.

2.3 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop support curbs.
 - 4. Cants.
 - 5. Furring.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any of the following species:
 - 1. Hem-fir (north); NLGA.
 - 2. Mixed southern pine or southern pine; SPIB.
 - 3. Spruce-pine-fir; NLGA.
 - 4. Hem-fir; WCLIB or WWPA.
 - 5. Spruce-pine-fir (south); WCLIB, or WWPA.
 - 6. Western woods; WCLIB or WWPA.
- C. Concealed Boards: 19 percent maximum moisture content of any of the following species and grades:
 - 1. Mixed southern pine or southern pine, No. 2 grade; SPIB.
 - 2. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; WCLIB, or WWPA.
 - 3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common] grade; WCLIB, or WWPA.
 - 4. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.4 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels for mounting electrical, data or telephone equipment: Plywood, DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, 3/4-inch nominal thickness unless otherwise indicated.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M, or of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Screws for Fastening to Metal Framing: ASTM C 1002 or ASTM C 954, length as recommended by screw manufacturer for material being fastened.
- D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

Hilti, Inc.
Powder Power Tool Corp.; Drive-It
Ramset Fastening Systems; Ramset

- E. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 or ICC-ES AC58 for mechanical anchors in masonry and concrete; and ICC-ES AC193 or ICC-ES AC308 for adhesive anchors in masonry and concrete; as appropriate for the substrate.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.6 METAL FRAMING ANCHORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Simpson Strong-Tie Company Inc.
K. C. Metals Products; Superspeed Connectors
Silver Metal Products, Inc.
USP Structural Connectors.

- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

1. Use for interior locations unless otherwise indicated.

- C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.

1. Use for wood-preservative-treated lumber and where indicated.

- D. Stainless-Steel Sheet: ASTM A 666, Type 304.

1. Use for exterior locations and where indicated.

2.7 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

- B. Water-Resistive Barrier: As specified in Section 07 25 00.
- C. Self-Adhering Flashings: As specified in Section 07 25 00.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches on center.
- G. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- I. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- J. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.10.1, "Fastening Schedule," in ICC's International Building Code.
 - 2. ICC-ES evaluation report for fastener.
- K. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish

materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal size furring horizontally at 24 inches on center.
- C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal size furring vertically at 16 inches on center.

3.4 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

06/06/19

SECTION 06 16 00

SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Requirements:

1. Section 06 10 53 "Miscellaneous Rough Carpentry" for plywood backing panels.
2. Section 07 25 00 "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preserved treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For following products, from ICC-ES:

1. Preservative-treated plywood.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

- A. Emissions: Products shall meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Plywood: DOC PS 1.
- C. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- D. Factory mark panels to indicate compliance with applicable standard.

2.2 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and plywood in contact with concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.3 WALL SHEATHING

- A. Plywood Sheathing: DOC PS 1, APA Rated, Exterior, Structural I, sheathing:
 - 1. Span Rating: Not less than 24/16.
 - 2. Nominal Thickness: As indicated.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153.
 - 2. Fasteners and connectors in contact with preservative-treated wood: Comply with corrosion resistance per CBC Sec. 2304.9.5
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70. Acceptable manufacturers or equal:

Hilti, Inc.

- D. Wood Screws: ASME B18.6.1. Sizes indicated.
- E. Screws for Fastening Sheathing to Wood Framing: ASTM C 1002.
- F. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- G. Lag Bolts: ASME B18.2.1. Sizes indicated.
- H. Bolts: Steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers. Where exposed to view, use only hexagonal head fasteners and matching nuts, and limit projection of bolt beyond face of nut to 1/2-inch.
- I. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E488 conducted by a qualified independent testing and inspecting agency.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.10.1, "Fastening Schedule," in 2016 CBC.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods:
 - 1. Wall Sheathing:
 - a. Install as indicated. Nail to wood framing.
 - b. Screw or nail to cold-formed metal framing as indicated on Drawings.
 - c. Space panels 1/8 inch apart at edges and ends.
 - d. Stagger sheets and install with long dimension perpendicular to supports except where otherwise noted.
 - e. Provide solid bearing under edges of sheathing as indicated on Drawings.

END OF SECTION

06/06/18

SECTION 06 20 23

INTERIOR FINISH CARPENRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior standing and running trim.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Sections:

1. Section 09 91 00 - Painting: Finishing of all finish carpentry work.

1.2 REFERENCES

A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

- APA-The Engineered Wood Association (APA)
- National Electrical Manufacturers' Association (NEMA)
- U.S. Department of Commerce, National Institute of Standards and Technology
- Woodwork Institute (WI):
 1. "North American Architectural Woodwork Standards" current edition.
- Wood Moulding and Millwork Producers Association (WMMPA)

1.3 SUBMITTALS

A. Shop Drawings:

1. Submit shop drawings of finish carpentry for review. Prepare shop drawings in accordance with the WI "North American Architectural Woodwork Standards (NAAWS)", current edition.
2. Affix the WI Certified Compliance Label to the first page of Millwork Shop Drawings, certifying that the materials will be manufactured in accordance with the Woodwork Institute grade specified.

B. Samples: Submit samples of millwork, exposed woods, and other finish materials and trim specified herein.

C. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 QUALITY ASSURANCE

A. Woodworking Standards: Manufacture finish carpentry in accordance with WI "NAAWS" current edition, grades as specified herein.

- B. Lumber and Plywood Standards: Meet the requirements of WI "NAAWS" current edition, grades as specified herein.
- C. Certification: Before delivery to the project site, issue a WI Certified Compliance Certificate indicating that the finish carpentry products furnished fully meet requirements of the grade specified.
 - 1. Upon completion of installation issue a WI Certified Compliance Certificate for installation.
- D. Reinspection: In case of a dispute concerning quality of the finish carpentry, a reinspection of the millwork by a representative of WI shall be conducted at no additional cost to the District.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver materials until project construction is ready for installation. Provide a clean storage area as required by WI "NAAWS" current edition, Section 2 - Care and Storage.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Softwood Lumber: WI "NAAWS" current edition, Section 3 - Lumber, of grades and species specified for the various applications.

2.2 INTERIOR FINISH CARPENTRY

- A. Standing and Running Trim:
 - 1. Opaque Finish: Custom Grade of any softwood species for opaque finish in accordance with WI "NAAWS" current edition, Section 6 - Interior and Exterior Millwork.
- B. Stock Moldings: Provide stock molding patterns graded under WMMPA WM 4-2004, complying with sections indicated, P-Grade for opaque finish. Provide material as specified herein for standing and running trim.

2.3 HARDWARE

- A. Nails, bolts, washers, nuts, wood screws, lag screws, other fasteners, shall be best suited for their specific condition. Nails shall be steel, common or finished, as required.

2.4 MISCELLANEOUS MILLWORK

- A. Finish carpentry, millwork and miscellaneous items and their related components that are to be furnished are not necessarily individually described. Furnish and install finish carpentry work and miscellaneous items not mentioned or otherwise described in accordance with the intent of the drawings and specifications and as required to complete the work.

2.5 FABRICATION

- A. Back out or kerf backs of the following members, except those with ends exposed in finished work:
 - 1. Interior standing and running trim, except shoe and crown molds.
- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours, unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.
- B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 2. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
 - 3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 4. Install stairs with no more than 3/16-inch variation between adjacent treads and risers and with no more than 3/8-inch variation between largest and smallest treads and risers within each flight.
 - 5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

- C. Back cut end joints in trim members approximately 85 degrees to provide a tight, straight butt joint and stagger joints at least 24-inches apart.
- D. Wherever possible, work materials to completion in the shop. Deliver parts of fabricated items to the site in as few pieces as possible. Fabricate mullions, heads, sills, and jambs in one piece wherever possible. Provide joints within each piece as unapparent as possible.
- E. Members that indicate checking or warping will be rejected. Poor grain combinations will also be rejected on parts that are to be exposed in the work.
- F. Install assembled items in the work carefully and neatly. Scribe as required for tight, straight, fit. Do not force installation. Shim as required for straight, level and plumb finished surfaces.
- G. Wherever possible, set nails in a manner that will leave them unseen in the final work. Do not drive exposed nails home, but set for putty with the proper sized nail set. Hammer marks on finished surfaces will be cause for rejection. Use wood screws only where heads are to be covered by other materials and where they will remain out of sight in the finished work.
- H. Priming and Backpriming: Prime and backprime wood surfaces as specified under Section 09 91 00 and in accordance with WI "NAAWS" current edition. Perform priming and backpriming before such products are installed in the work. Receive proper inspection of all surfaces before additional work is started.
- I. Protect all parts from injury after installation in the work and maintain protection until completion of the entire Project.

3.4 STANDING AND RUNNING TRIM INSTALLATION

- A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
 - 1. Install trim after gypsum-board joint finishing operations are completed.
 - 2. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 ADJUSTING

- A. Replace interior finish carpentry that is damaged or does not comply with requirements. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.6 CLEANING

- A. Clean interior finish carpentry on exposed and semiexposed surfaces. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.7 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

06/06/18

SECTION 06 41 16

PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-clad architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Sections:

1. Section 05 50 00 "Metal Fabrications" for steel angle support for cantilevered countertops.
2. Section 06 10 53 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.

1.2 REFERENCES

A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

- American Iron and Steel Institute (AISI)
- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM International)
- National Electrical Manufacturers' Association (NEMA)
- U.S. Department of Commerce (DOC)
- Woodwork Institute:
 1. WI – North American Architectural Woodwork Standards 3.1

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

B. Before framing is completed, hold a meeting of the contractor, the casework manufacturer, casework installer and the framing contractor.

1. Review the locations of backing required for casework installation as shown on the casework shop drawings.
2. Review the method of attachment of the backing to the wall system as shown on the architectural drawings.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product, including panel products, high-pressure decorative laminate, adhesive for bonding plastic laminate, and cabinet hardware and accessories.
- B. Shop Drawings:
 - 1. Submit Shop Drawings showing list of materials and hardware, sizes, sections, elevations and details of construction and assembly as required by Woodwork Institute *North American Architectural Woodwork Standards 3.1*, Section 1 – Submittals.
 - 2. Indicate grounds, backing, blocking, sleepers and other items required for the installation of cabinet work which are to be furnished and installed as part of the structure.
 - 3. Affix the Woodwork Institute Certified Compliance Program label to the first page of the Shop Drawings, certifying that the cabinets will be manufactured in accordance with the Woodwork Institute grade specified.
- C. Samples for Initial Selection:
 - 1. Plastic Laminate: Submit samples of each type of plastic laminate, including complete color and pattern range and surface finish.
- D. Samples for Verification:
 - 1. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish, with one sample applied to core material, and specified edge material applied to one edge.
 - 2. Exposed Cabinet Hardware: Submit one unit of each type and finish. Approved samples may be used in the work.
- E. Submittal procedures and quantities are specified in Section 01 33 00.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and fabricator.
- B. Product Certificates: For the following:
 - 1. Composite wood and agrifiber products.
 - 2. Thermoset decorative panels.
 - 3. High-pressure decorative laminate.
 - 4. Adhesives.
- C. Woodwork Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.
- D. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-

service performance. It is preferable, but not mandatory, that Shop is a licensee of WI's Certified Compliance Program.

- B. Installer Qualifications: Fabricator of products.
- C. Regulatory Requirements: Wall hung cabinets and floor supported cabinets over 5 feet high shall be braced and anchored in accordance with the 2016 California Building Code (CBC) Title 24 Part 2.
- D. Manufacturing Standards:
 - 1. Cabinets: Manufacture plastic laminate faced cabinet work in accordance with Woodwork Institute *North American Architectural Woodwork Standards 3.0*, latest edition, Section 10, Casework - Laminated Plastic, Custom Grade, except as modified herein.
 - 2. Plastic Laminate Countertops: Manufacture plastic laminate countertops in accordance with Woodwork Institute *North American Architectural Woodwork Standards 3.0*, latest edition, Section 11, Countertops - Laminated Plastic, Custom Grade.
- E. Certified Compliance:
 - 1. Before delivery to the job site, the woodwork supplier shall provide a Woodwork Institute Certified Compliance Certificate indicating the millwork products being supplied and Certifying that these products fully meet the requirements of the Grade or Grades specified.
 - 2. Each elevation of casework, each laminated plastic top, and each solid surface top shall bear a Woodwork Institute Certified Compliance Label.
 - 3. At completion of installation, the woodwork installer shall provide a Woodwork Institute Certified Compliance Certificate indicating the products installed, and certifying that the installation of these products fully meets the requirements of the Grade or Grades specified.
 - 4. All fees charged by the Woodwork Institute for its Certified Compliance Program are the responsibility of the millwork manufacturer and/or installer and shall be included in their bid.
- E. Reinspection: In case of a dispute concerning quality of the casework, a reinspection of the casework by a representative of Woodwork Institute shall be conducted at no additional cost to the Owner.
- F. Certified Seismic Installation Program:
 - 1. Before walls are closed up provide a written Woodwork Institute Certified Seismic Installation Program report confirming that backing is provided in all locations required for casework installation or identifying those locations where backing is missing or improperly located.
 - 2. On completion of installation provide a Woodwork Institute Certified Seismic Installation Program Certificate, identifying the work covered and certifying that installation meets the requirements of the WI CSIP attachment details and schedules.
 - 3. All fees charged by the Woodwork Institute for their Certified Seismic Installation Program are the responsibility of the millwork installer and shall be included in their bid. Certification is a prerequisite for final acceptance. For further information, visit www.woodworkinstitute.com.

- G. Single source responsibility: A single manufacturer shall provide and install the work of described in this section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
- B. Provide a clean storage area as required by *Woodwork Institute North American Architectural Woodwork Standards 3.1, Section 2 – Care and Storage*.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the *"North American Architectural Woodwork Standards"* for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. Provide labels and certificates from WI certification program indicating that woodwork, including installation, complies with requirements of grades specified.
- B. Grade: *North American Architectural Woodwork Standards Custom Grade*.

- C. Type of Construction: *North American Architectural Woodwork Standards* Construction Type A - Frameless.
- D. Cabinet and Door Front Interface Style: Flush overlay.

2.2 MATERIALS

A. Plastic Laminate: Meet the requirements of NEMA LD3.

1. Horizontal Surfaces: NEMA GP 50 high pressure plastic laminate, nominal 0.050-inch thick, except where postforming type is required provide NEMA PF-42, nominal 0.042-inch thick, conforming to Woodwork Institute *North American Architectural Woodwork Standards*, Section 4, Article 4.4.7, and Section 10, Article 10.4.5.
2. Vertical Surfaces: NEMA GP-28, nominal 0.028-inch thick.
3. Cabinet Liners: Comply with Woodwork Institute *North American Architectural Woodwork Standards*, Section 10 for Grade specified.
4. Backing Sheets: Comply with Woodwork Institute *North American Architectural Woodwork Standards*, Section 10 for Grade specified.
5. Surface Finish: Satin finish.
6. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - a. As selected by Architect from laminate manufacturer's full range in the following categories:
 - 1) Solid colors: Satin or matte finish.
 - 2) Wood grains: Satin or matte finish.
 - 3) Patterns: Satin or matte finish.
 - b. Vertical Surfaces: TBD.
 - c. Horizontal Surfaces: TBD.
7. Pattern Direction: Vertically for doors and fixed panels.
8. Acceptable manufacturers or equal:

Formica Corporation
 Micarta Div.
 Nevamar Corporation
 Wilsonart International, Inc.

B. Core: Combination Core Plywood.

1. Basis of Design Product: Raw, 2 Step ArmorCore® "Blank" panels by States Industries LLC; www.StatesInd.com; or ClassicCore® by Columbia Forest Products.
 - a. Description: ArmorCore panels combine the low weight and high strength advantages of veneer cored panels with the superior flatness and higher density of Medium Density Fiberboard. ArmorCore panels are stiffer, lighter, and stronger than composition panels of equivalent thickness, yet the MDF crossbands match the best composition surface characteristics.
 - b. Performance Specifications:
 - 1) MOE: 630,200 lb/in²
 - 2) MOR: 4,922 lb/in²
 - 3) Screw holding, face: 324 lbf.
 - 4) Screw holding, edge: 271 lbf.
 - 5) Weight: 2,656 lbs per MSF of 3/4"
 - 6) Thickness tolerance: +0; -3/64"
 - c. Panel thickness: As shown on drawings.

- C. Lumber: In accordance with the *North American Architectural Woodwork Standards* Grade specified for the product being fabricated. Moisture Content: 6% to 12% for boards up to 2-inch nominal thickness, and shall not exceed 19% for thicker pieces.
- D. Hardboard: Meet or exceed Commercial Standard CS-251 and Fed. Spec. LLL-B-00810, tempered, 1/4-inch thick, smooth both sides. Pre-finish exposed surfaces in color to match cabinet interior, pre-finish opposite surface with neutral color balance coating.
- E. Visible Edges, Exposed and Semi-Exposed: 3mm purified PVC edge bands of size to suit material thickness. Colors of the specified manufacturer if shown on the color legend in the plans shall govern. If the Contractor wishes to substitute for the manufacturer's color already specifically called out in the plans, the substitution is subject to rejection if it does not match the required condition, per the Architect's judgement. In the event the Architect rejects it, the specified color and the manufacturer called out in the color legend shall be provided. Hot melt apply to edges of cabinet ends, shelves, and doors.

2.3 HARDWARE

- A. Hinges: Woodwork Institute Grade 1 as approved for schools and hospitals. Acceptable products or equal:

Rockford Process Control; No. 376 or No. 456

- B. Pulls: Surface mounted "U" shaped aluminum, US 28 finish. Acceptable products or equal:

Builders Brass Works; 9054
Quality Hardware; No. 812

- C. Catches:

- 1. Doors Without Locks: Magnetic type with aluminum case. Acceptable products or equal:

Amerock; #9765
Epco; No. EP591

- 2. Inactive Leaf of Pairs of Doors With Locks: Elbow catch. Acceptable products or equal:

Amerock; No. B238-14A
Ives 2A-92

- D. Shelf Rests for Bored Hole Shelf Support System: BHMA A156.9, B04013; plastic locking shelf support, 1/4" pin length. Acceptable product or equal:

K&V 339 Series for 3/4" shelves; 340 Series for 1" shelves.

- E. Door Locks:

- 1. General: Deadbolt locks from Olympus Lock, Inc.; www.olympus-lock.com
- 2. Door Locks:
 - a. Cabinet Doors: Olympus Lock 500DR (Door), with 56-1 bar strike; or Corbin Cabinet Lock 0737 (Door).
 - b. Local Distributor Contact: JSwis Sales, Inc. 559-260-0331.
 - c. Cabinet locks are easily rekeyable via set screw cylinder release mechanism. All locks to include: Pin tumbler design with working cylinder slides and forwardly removable cylinders for rekeying without totally disassembling lock

body. Furnish 2 keys per lock and bar or slotted strikes as required. Provide spacers as required for flush fit with outside face of casework material. Locks shall be capable of being keyed alike, keyed different and/or master keyed per supplied schedule. Locks will have passed ANSI A156.11 Grade 1 cycle testing.

3. Cam locks shall be easily rekeyable pin tumbler with working top slide and retainer staple.
4. Provide locks on all doors.
5. Locks for doors shall be keyed alike for each room and master keyed to comply with the Owner's keying system. Purchase master keyed cylinders from the hardware supplier specified in Section 08 71 00.
6. Metal Strike Plates: Provide cabinet door locks with metal strike plates to protect against particleboard rip out.

F. Label Holders: Acceptable product or equal:

Knape & Vogt; No. K010

G. Countertop Grommets: Acceptable product or equal:

Hafele; HA 429.99.735

H. Screws: Straight shank double thread particleboard screws.

2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.5 FABRICATION

- A. Grade: NAAWS Custom Grade.
- B. Fabricate cabinets to dimensions, profiles, and details indicated.
- C. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- D. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
- E. Cabinets: Fabricate cabinets to meet Woodwork Institute *North American Architectural Woodwork Standards* 3.1, Construction Type A - Frameless, Style 1 - Flush overlay.

Provide finished end panels of either applied panels or integral members on exposed ends of cabinets. Close gaps at walls with filler panels not to exceed 3-inches wide.

1. Semi-Exposed Surfaces: Finish semi-exposed surfaces of open cabinets or behind glass doors to match exposed surfaces.
 2. Cabinet interiors (other than semi-exposed surfaces) including faces of shelving therein, and interior door faces: Finish with cabinet liner as specified herein, color as selected by the Architect.
- F. Doors: Flush overlay type, hinged to swing flat against the face of adjoining cabinet or the side of cabinet, with square corners, and edges finished with plastic laminate or 3mm purified PVC. Notch door or cabinet ends, or divisions to receive hinge.
- G. Door Fronts: Vertical grade plastic laminate covered. Core material shall be as specified in paragraph 2.2.B. Finish exposed edges with plastic laminate or 3mm purified PVC, color as selected by the Architect, hot-melt applied.
- H. Shelves: Comply with Woodwork Institute *North American Architectural Woodwork Standards 3.1* and Technical Bulletin 435 for 50 pound per square foot load test.
- I. Toe Kick Base:
1. Typical Cabinets: Furnished and installed under Section 09 65 13.
- J. Countertops and Splashes:
1. Plastic Laminate Countertops: Custom Grade in accordance with Woodwork Institute *North American Architectural Woodwork Standards 3.1*, Section 11, plastic laminate covered, including square butt top, exposed edges and ends self-edged. Core material: As specified in paragraph 2.2.B.
 2. Front edges: Self Edgeband with Narrow Build Up.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of conditions: Verify that mechanical, electrical, plumbing, and other building components affecting work in this section are in place and ready.

3.2 PREPARATION

- A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.
- B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

3.3 INSTALLATION, GENERAL

- A. General: Install work as specified in Woodwork Institute *North American Architectural Woodwork Standards* and provide a Woodwork Institute Certified Compliance Certificate for installation as specified herein.
- B. Grade: Install cabinets to comply with same grade as item to be installed.

- C. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.
- D. Install cabinets plumb, level, true and straight with no distortions. Shim as required using concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- E. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damage at finished cuts.
- F. Secure to ground, stripping, blocking with countersunk, concealed fasteners. Install without distortion so that doors fit openings and are accurately aligned.
- G. Base Cabinets: Set cabinets straight, plumb, and level. Adjust sub-tops within 1/16-inch of a single plane. Fasten each individual cabinet to floor at toe space, with fasteners spaced 24-inches on center. Bolt continuous cabinets together. Secure individual cabinets with not less than 2 fasteners into floor, where they do not adjoin other cabinets.
 - 1. Where required, assemble units into one integral unit with joints flush, tight, and uniform. Align similar adjoining doors to a tolerance of 1/16-inch.
- H. Wall Cabinets: Securely fasten to solid supporting material, not plaster, lath, or gypsum board. Anchor, adjust, and align wall cabinets as specified for base cabinets.
 - 1. Reinforcement of stud walls to support wall-mounted cabinets specified in appropriate section, but responsibility for accurate location and sizing of reinforcement shall be coordinated with applicable trade.
- I. Adjust casework and hardware so that doors operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.
- J. Install finish hardware after all finish work has been completed. Inspect drilling operations for surface splinters or delaminations. Pieces bearing such imperfections will be rejected.

3.4 INSTALLATION OF TOPS

- A. Field Jointing: Where practicable, make in same manner as factory jointing using doweled, splines, adhesives, and fasteners recommended by manufacturer. Locate field joints as shown on accepted shop drawings; factory prepared so there is no project site processing of top and edge surfaces.
- B. Fastening: Use concealed clamping devices for field joints located within 6-inches of front, at back edges and at intervals not exceeding 24-inches. Tighten in accordance with manufacturer's instructions to exert a constant, heavy clamping pressure at joints. Secure tops to cabinets with "Z" type fasteners or equal, using 2 or more fasteners at each front, end, and back.
- C. Workmanship: Abut tops and edge surfaces in one true plane, with internal supports placed to prevent any deflection. Provide flush hairline joints in top units using clamping devices. At joints in epoxy tops, use manufacturer's recommended adhesives and holding devices to provide joint widths not more than 1/16-inch wide at any location, completely filled and flush with abutting edges.
 - 1. After installation, carefully dress joints smooth, remove surface scratches, clean and polish entire surface.
 - 2. Provide holes and cutouts as required for mechanical and electrical work.
 - 3. Provide scribe moldings for closures at junctures of top, curb and splash with walls as recommended by manufacturer for materials involved. Use chemical resistant, permanently elastic sealing compound where recommended by manufacturer.

- D. Plastic Laminate Countertops:
 - 1. Where no splash occurs, scribe the back edge of the counter top to the wall.
 - 2. Secure joints in the counter tops with draw bolts, sized and spaced as recommended by Woodwork Institute for Custom Grade counter tops.
 - 3. Apply adhesive using cold-press method and a pressure of not less than 30 psi.
- E. Coordinate work with Divisions 23 and 26 for Mechanical and Electrical work to be integrated into casework.

3.5 FIELD QUALITY CONTROL

- A. Provide Woodwork Institute Certified Seismic Installation Program inspection reports and certification as required in Part 1 of this Section.

3.6 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION

06/08/18

SECTION 06 42 19

FRAMED DECORATIVE PANEL SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Decorative 7/16" thick prefinished panel mechanically and adhesively applied directly to a solid substrate, utilizing a pre-engineered application process.
 - 1. Hardware: Extruded aluminum joinery moldings, extruded aluminum perimeter trim moldings and mechanical fasteners.
 - 2. Panels:
 - a. Fire-Rated HPL laminated to Fire-Rated wood fiber substrate, with balancing backer.
 - b. Non Fire-Rated HPL laminated to wood fiber substrate, with balancing backer.
- B. Products Not Furnished or Installed under This Section:
 - 1. Gypsum Board backup.
- C. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- D. Related Sections:
 - 1. Section 06 20 23 - Interior Finish Carpentry.
 - 2. Section 06 41 16 - Plastic-Laminate-Clad Architectural Cabinets.
 - 3. Section 09 22 16 - Non-Structural Metal Framing.
 - 4. Section 09 29 00 - Gypsum Board.
 - 5. Section 09 91 00 - Painting.
 - 6. Section 09 65 13 - Resilient Base and Accessories.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. Architectural Woodwork Standards as published by the Architectural Woodwork Manufacturers Association of Canada, and the Woodwork Institute.
 - 1. *North American Architectural Woodwork Standards 3.1.*

1.3 SUBMITTALS

- A. Product Data: Submit sufficient manufacturer's data to indicate compliance with these specifications, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.

- B. Shop Drawings: Submit elevations of each wall showing location of paneling and trim members with respect to all discontinuities in the wall elevation.
- C. Selection Samples: Submit manufacturer's standard color and pattern selection samples representing manufacturer's full range of available colors and patterns pertinent to the project.
- D. Samples for Verification: Submit 6" by 10" section of panel for each panel selected indicating the color, texture, and pattern required.
 - 1. Submit complete with specified applied finish.
 - 2. Exposed Molding and Trim: Include 4" long samples of each type, finish, and color.
- E. Manufacturers Material Safety Data Sheets (MSDS) for adhesives, sealants and other pertinent materials prior to their delivery to the site (available as downloads for most Marlite's products at <http://www.marlite.com/tech-details.aspx> or by contacting Marlite at info@marlite.com).
- F. Maintenance Instructions.
- G. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 QUALITY ASSURANCE

- A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:
 - 1. ASTM E 84 (Method of test for surface burning characteristics of building Materials)
 - 2. Required Rating – Class A.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver panels and associated materials factory packaged on strong pallets and properly packaged or protected.
 - 1. Upon delivery carefully inspect all cartons, packages, pallets and protective wrap for damage or material shortage.
 - 2. Open and inspect suspect packages, cartons or wrapped pallets for damage.
 - 3. Contact shipper immediately to report any damaged or missing materials.
 - 4. Contact Marlite @ (800) 377-1221 immediately to report any damaged or missing materials.
 - 5. Contact Marlite @ (800) 377-1221 with any questions, problems or concerns.
- B. Store products in manufacturer's unopened packaging until ready for installation.
 - 1. Maintain plastic or other protective wrap in place during on site handling until ready for installation.
 - 2. Keep panels clean and do not stack panels after removal of protection.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.6 PROJECT CONDITIONS

- A. Wood composite panels are subject to the effects of humidity and temperature. Do not use in kitchens, rest rooms, or other high humidity areas.

- B. Partition walls are to be finished and the building completely closed. Walls shall be thoroughly dry and concrete cured and dry before starting installation.
- C. HVAC system must be operable and installation area must be balanced to normal operating conditions.
- D. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. To ensure product performance, a temperature range of 60 degrees F – 80 degrees F and a humidity range of 35-55% must be maintained during storage, installation and product life cycle. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.7 COORDINATION AND SEQUENCING

- A. Except as specified by the architect, locate trim members so that panel lines coordinate with doors, headers, jambs and other discontinuities in a wall.
- B. Provide vapor barrier on exterior walls behind backing to discourage warping.

1.8 WARRANTY

- A. Standard Warranty: All products shall be warranted to be free from defects for a period of 1 year after Substantial completion.

PART 2 - PRODUCTS

2.1 ACCEPTABLE PRODUCT

- A. Marlite; 202 Harger Street, Dover, OH 44622. 800-377-1221 FAX (330) 343-4668 Email: info@marlite.com www.marlite.com.
- B. Basis-of-Design Product: Flame Safe Panel System, designated as CP-4.
 - 1. CP-4 Divider System: A non-progressive wall panel system featuring a two-piece hidden divider molding that allows for ease of panel installation or replacement.

2.2 HARDWARE

- A. Hardware and Trim Material: Heavy weight extruded aluminum 6063-T5 alloy furnished in lengths as indicated and factory prefinished.
- B. Provide the following exposed edge trim, trim receivers, trim profiles and other manufacturer's standard members as required for a complete installation.
 - 1. Horizontal Cap Molding: Marlite part #CP-107 Edge Cap. Available in 8' and 10' lengths.
 - 2. Vertical Cap Molding: Marlite part #CP-280. Available in 8' and 10' lengths. Edge/Inside Corner: Marlite part #CP270. Available in 8' and 10' lengths. 90 Degree Outside Corner: Marlite part #CP90C Outside Corner. Available in 8' and 10' lengths.
- C. Aluminum Finishes:

1. Concealed: Mill finish.
2. Exposed: Clear Satin Anodize.

2.3 PANELS

A. Panels shall be Flame Safe Panel System with Class A construction and finish as follows.

1. High Pressure Laminate:
 - a. Vertical grade decorative laminate face over wood fiber substrate, with balancing backer.
 - 1) Wilsonart Laminate:
 - a) Type 602 - 0.032" (0.85mm) Fire-Rated decorative face.
 - b) Type 264 - 0.030" (0.76mm) Fire-Rated balancing backer.
 - c) Type 335 - 0.030" (0.76mm) Non Fire-Rated decorative face.
 - d) Type 235 - 0.028" (0.71mm) Non Fire-Rated balancing backer.
 - 2) Formica Laminate:
 - a) Type 32 - 0.032" (0.85mm) Fire-Rated decorative face.
 - b) Type 87 - 0.028" (0.71mm) Fire-Rated balancing backer.
 - c) Type 20 - 0.030" (0.76mm) Non Fire-Rated decorative face.
 - d) Type 9302 - 0.025" (0.63mm) Non Fire-Rated balancing backer.
 - 3) Nevamar:
 - a) Type VR-3 - 0.032" (0.85mm) Fire-Rated decorative face.
 - b) Type VF-3 - 0.028" (0.71mm) Fire-Rated balancing backer.
 - 4) Other than listed laminate manufacturers:
 - a) Consult directly with Marlite.
2. Colors:
 - a. Fire-Rated: Solid colors or wood-grain patterns as selected by Architect from manufacturer's standard colors and patterns.
 - b. Non Fire-Rated: Solid colors or wood-grain patterns as selected by Architect from manufacturer's standard colors and patterns.
3. Finishes:
 - a. Fire-Rated: Satin finish.
 - b. Non Fire-Rated: Satin finish.
4. Grain Direction: Manufacturer's standard (typically parallel with longest dimension of HPL product).
5. Panel Size: Nominal 48" wide x 96" long.

B. Wood Fiber Substrate:

1. Class A: Marlite panels are typically manufactured using various wood fiber substrates having either 75%, 82% or 100 % recycled wood waste. When available as Fire-Rated, a higher percentage may be specified if required for environmental credits.

2.4 FABRICATION

- A. All framing, panels, hardware and accessories shall be factory finished and ready to install except for field fabrication as required by jobsite and perimeter conditions.
1. Refinish field cut panel edges in accordance with manufacturer's instruction before installation.
 2. For all cut-outs, drill corners for a minimum 1/8" radius.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Installer's Examination: Examine conditions under which construction activities of this section are to be performed. Submit written notification to Architect and system manufacturer if such conditions are unacceptable. Beginning erection constitutes installer's acceptance of conditions.
 - 1. Verify that a vapor barrier has been provided on exterior walls behind backing to prevent warping.
 - 2. Verify backing and mounting surfaces are smooth, solid, and flat. All drywall joints are to be taped and finished.
 - 3. Verify that walls are sealed and primed before installation begins.
 - 4. Verify mechanical, electrical, and building service and/or items affecting work of this section are placed and ready to receive this work.
 - 5. Verify that structural stud spacing does not exceed 24" on-center.
- B. Structural walls are to be finished, with building completely closed. Walls shall be thoroughly dry before starting installation.

3.2 PREPARATION

- A. Conditioning: Panels must be allowed to acclimate to a balanced environment in the installation location for 72 hours prior to installation.
- B. Protect existing surfaces with drop cloths.
- C. Except as directed by the architectural drawings, before installing, examine panels and arrange to achieve best combination of color, pattern, texture and grain.

3.3 INSTALLATION

- A. Install all materials in strict accordance with the manufacturer's installation instructions and recommendations, with hardware straight, plumb, and level.
 - 1. Anchor units rigidly and securely in place.
 - 2. Cut sheets to meet existing supports.
- B. Fasten supports and trim using appropriate fasteners into a stud or other solid substrate at centers as specified by the manufacturer. Where screws do not hit the studs, fasten with adhesive in accordance with the manufacturer's recommendations. Pre-drill holes thru the members and fasten the screw flush with the flange on the aluminum profile. Where necessary countersink for the screw head to seat flush with the flange.
- C. Avoid contamination of the panel faces with adhesives, solvents or cleaners during installation.

3.4 CLEANING AND PROTECTION

- A. Clean and remove dust and other foreign matter from panel and framing surfaces. Clean finishes in accordance with manufacturer's instructions.

END OF SECTION

06/08/18

SECTION 06 64 01

FIBERGLASS REINFORCED PLASTIC PANELING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Fiberglass reinforced plastic (FRP) paneling for wall surfaces, including trim accessories.
- B. Related Requirements:
 - 1. Section 06 10 53 "Miscellaneous Rough Carpentry" for wood furring for installing plastic paneling.

1.2 REFERENCES

- 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 D256 – Standard Test Methods For Determining the Izod Pendulum Impact Resistance of Plastics.
 - 2. ASTM D570 – Standard Test Method For Water Absorption of Plastics.
 - 3. ASTM D638 – Standard Test Method For Tensile Properties of Plastics.
 - 4. ASTM D2583 – Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
 - 5. ASTM D5319 – Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
 - 6. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. Crane Composites (Inspired by Kemlite):
 - 1. Installation Guide For FRP Panels #6876.

1.3 ADMINISTRATIVE REQUIREMENTS

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

1.4 ACTION SUBMITTALS

- A. Product Technical Data: For each type of product required.
- B. Shop Drawings: Showing layout, profiles and product components, including anchorage, accessories, finish colors, patterns and textures. Indicate location and dimension of joints and fastener attachment.

- C. Samples: Selection and verification samples for finishes, colors and textures. Submit two samples of each type of panel, trim and fastener.

1.5 INFORMATIONAL SUBMITTALS

- A. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.
- B. Test and Evaluation Reports: Showing compliance with specified performance characteristics and physical properties.
- C. Manufacturer's Instructions: Manufacturer's Installation Guide for FRP #6876.
- D. Qualifications Statements: For manufacturer and installer.
- E. Environmental Certifications: Certificates for GREENGUARD Indoor Air Quality and Children & Schools Certification.

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 MAINTENANCE MATERIALS

- A. Extra Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 77 00 – Contract Closeout and Final Cleaning.
 - 1. Quantity: Furnish quantity of FRP units equal to 2 percent of amount installed.
 - 2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra materials.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Provider of advanced installer training.
- B. Installer Qualifications:
 - 1. At least five years experience in the installation of fiberglass reinforced plastic panels.
 - 2. Experience on at least five projects of similar size, type and complexity as this Project.
 - 3. Employer of workers for this Project who are competent in techniques required by manufacturer for installation indicated.
- C. Mock-Ups: Install at project site a job mock-up using acceptable products and manufacturer approved installation methods. Obtain Owner and Architect approval and acceptance of finish color, texture, pattern, trim, fasteners and quality of installation.
 - 1. Mock-Up Size: Minimum 8 feet wide by full height, including vertical panel seams.

2. Maintenance: Maintain mock-up during construction for quality comparison. Remove and legally dispose of mock-up when no longer required.
 3. Incorporation: Mock-up may be incorporated into final construction upon Owner approval.
- D. Surface-Burning Characteristics: Determined by testing identical products according to ASTM E84 by a testing agency acceptable to authorities having jurisdiction.
1. Flame-Spread Index: 25 (Class A) or less.
 2. Smoke-Developed Index: 450 or less.
- F. Environmental Certification: GREENGUARD [Indoor Air Quality and Children & Schools Certified].

1.8 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Package sheets on skids or pallets for shipment to project site.
- B. Storage and Handling: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Store panels in a dry indoor location at Project site. Remove any foreign matter from face of panel by using a soft bristle brush, avoiding abrasive action.

1.9 PROJECT CONDITIONS

- A. Ambient Conditions:
1. Do not begin installation until building is enclosed, permanent heating and cooling equipment is in operation, and residual moisture from plaster, concrete or terrazzo work has dissipated.
 2. During installation, and within 48 hours prior to installation, maintain ambient temperature and relative humidity within limits required by type of panel adhesive used and recommendation of panel adhesive manufacturer.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace FRP panels that fail within specified warranty period.
1. Failures shall include, but not be limited to substantial defects in material and workmanship, rotting, rusting, corrosion, development of structural surface cracks, or requiring painting or refinishing.
 2. Warranty Period: One year from date of Substantial Completion.
- B. Special Warranty: Installer's standard form in which installer agrees to repair or replace FRP panels that fail due to poor workmanship or faulty installation within the specified warranty period.
1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIBERGLASS REINFORCED PLASTIC (FRP) PANELS

- A. General: Fiberglass reinforced plastic panels complying with ASTM D5319.
 - 1. Low-Emitting Materials: Comply with testing and product requirements of California Department of Health Services standards for Volatile Organic Emissions.
- B. Basis of Design Product: Subject to compliance with requirements provide Crane Composites, Inc.; Innovative Finishes DESIGNS Wall Panel IPSA DESIGNS Class A Fiberglass Reinforced Plastic (FRP) Panels, or comparable product by the following:
 - 1. Marlite; www.marlite.com
- C. Substitutions: Submit substitution request in accordance with Section 01 25 13 - "Product Options and Substitutions."
- D. Product Options:
 - 1. Pattern(s): As selected by Architect from manufacturer's full range.
 - 2. Surface Finish: Smooth.
 - 3. Nominal Thickness: 0.075 inch (1.9 mm).
 - 4. Wall Panel Size: As indicated on drawings.
- E. Performance Criteria (Class A Panels):
 - 1. Flexural Strength: 18,000 psi, ASTM D790.
 - 2. Tensile Strength: 10,000 psi, ASTM D638.
 - 3. Barcol Hardness: 45, ASTM D2583.
 - 4. Impact Strength (IZOD): 8 ft-lb/sq in ASTM D256, showing no visible damage on finish side.
 - 5. Water Absorption: 0.16 percent in 24 hours at 77 deg F, ASTM D570.

2.2 ACCESSORIES

- A. Moldings: Polished aluminum.
- B. Panel Adhesive: As recommended by panel manufacturer for the required substrates.
 - 1. Adhesive shall have a VOC content of 50 g/L or less.
- C. Wall Protection Accessories: One-piece rubber accessories, configured to cover panel edges and corners.
 - 1. Color: As selected by Architect from manufacturer's full product range.
 - 2. Profile: As indicated on drawings, and as selected by Architect from manufacturer's full product range.
- D. Sealant: Mildew-resistant, single-component, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 07 92 00 "Joint Sealants."

2.3 SOURCE QUALITY CONTROL

- A. Obtain fiberglass reinforced panels, moldings and other accessories from a single manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General: Comply with manufacturer's product data, including product technical bulletins, and installation instructions in product catalogs and product packaging.
- B. Verify that substrates previously installed under other sections are acceptable for product installation in accordance with FRP manufacturer's instructions.
 - 1. Examine substrate surfaces to determine that corners are plumb and straight, that surfaces are smooth, sound and uniform, that nails or screw fasteners are countersunk, and that joints and cracks are filled flush and smooth with adjoining surfaces.
 - 2. Do not begin panel installation until substrate surfaces are in satisfactory condition.

3.2 PREPARATION

- A. Clean substrates to remove substances that could impair bond of adhesive, including oil, grease, dirt, dust or other contamination.
- B. Condition panels by unpacking and placing in installation space no less than 24 hours before installation.
- C. Lay out paneling before beginning installation. Locate panel joints to provide equal panel widths at ends of walls and so that trimmed panels at corners are not less than 12 inches wide.
 - 1. Mark plumb lines on substrate at panel joint locations for accurate installation.
 - 2. Locate panel joints to allow clearance at panel edges according to manufacturer's written instructions.

3.3 INSTALLATION

- A. General: Comply with panel manufacturer's Installation Guide #6876.
- B. Cut and drill panels, finished face down, with carbide tipped saw blades or drill bits, or cut with snips.
- C. Install panels with manufacturer's recommended gap for panel field and corner joints.
 - 1. Install panels in a full spread of adhesive. For trowel type and application of adhesive, follow adhesive manufacturer's recommendations.
- D. Install trim accessories with adhesive and nails or staples. Do not fasten through panels.
- E. Sealant:
 - 1. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.
 - 2. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths.

3.4 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.

3.5 PROTECTION

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

END OF SECTION

06/06/18

SECTION 07 21 00

THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass-fiber blanket.
2. Mineral-wool blanket.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Sections:

1. Section 07 52 00 "Modified Bituminous Membrane Roofing" for insulation specified as part of roofing construction.
2. Section 07 84 13 "Penetration Firestopping" for mineral wool firestopping insulation.
3. Section 07 84 43 "Joint Firestopping" for mineral wool firestopping insulation.

1.2 REFERENCES

A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

American Society for Testing and Materials (ASTM International)
U.S. General Services Administration, Federal Specification (FS)
Underwriters Laboratories (UL)

1.3 DESCRIPTION OF INSULATION SYSTEMS

A. Thermal insulation within light gage metal framed exterior walls:

1. Type: Unfaced mineral fiber batts or blankets.
2. Thickness: As required to obtain an R-value of not less than R-22.
3. Surface Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.
4. Installation Method: Friction fit between studs.

B. Sound retardant insulation within interior partitions:

1. Type: Unfaced mineral fiber batts or blankets.
2. Thickness: Not less than 5-1/2 inches.
3. Surface Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

4. Installation Method: Friction fit between studs.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Submittal procedures and quantities are specified in Section 01 33 00.

1.5 INFORMATIONAL SUBMITTALS

- A. Certificates of Conformance: Submit certificates from the manufacturer stating that materials meet the R-value and fire resistance and surface burning characteristics specified herein.

1.6 REGULATORY REQUIREMENTS

- A. Fire Performance Characteristics: Where insulation is used within a fire rated wall assembly, provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, in accordance with methods specified below, by UL or other testing and inspecting agency acceptable to State Fire Marshal.
 1. Surface Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 2. Fire Resistance Ratings: ASTM E119.
 3. Combustibility: ASTM E136.
- B. Certificate: As required by CBC Title 24, post a certificate containing the building permit number and the insulation manufacturer's name, material identification and R-value and stating that the insulation has been installed in accordance with the drawings and specifications.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver insulation to the site in unopened containers labeled with the manufacturer's name and brand designation and R-value rating.
- B. Store insulation in a dry, well ventilated, water-tight enclosure providing protection from damage. Do not store plastic insulation where it will be exposed to sunlight or to sources of ignition.

1.8 SEQUENCING AND SCHEDULING

- A. Do not install insulation until construction has progressed to the point that inclement weather will not damage or wet the insulation material.
- B. Install insulation after electric wiring, plumbing and other concealed work is in place.
- C. Insulation shall not be closed in until it has been inspected and approved.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. CertainTeed Corporation; www.certainteed.com
 - 2. Johns Manville; www.jm.com
 - 3. Knauf Insulation; www.knaufinsulation.us
 - 4. Owens Corning; www.owenscorning.com
- B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
 - 1. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
- C. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
 - 1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
 - 2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

2.3 MINERAL WOOL BLANKETS

- A. Mineral-Wool Blanket, Unfaced, ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. CertainTeed Corporation; www.certainteed.com
 - 2. Johns Manville; www.jm.com
 - 3. Owens Corning; www.owenscorning.com
 - 4. Thermafiber, Inc.; www.thermafiber.com
 - 5. Roxul Inc.; www.roxul.com

2.4 AUXILIARY INSULATING MATERIALS

- A. Fasteners: Fasteners shall be pneumatically driven fasteners, powder actuated fasteners of concrete stub nails. Fasteners shall be of sufficient length to penetrate at least 1-inch into the masonry substrate.

- B. Duct Tape: As recommended by the insulation manufacturer.
- C. Wire Mesh: Wire mesh shall be hexagonal zinc-coated steel poultry netting having a 1-1/2 inch mesh size and 0.048-inch diameter (18-gage) wire, conforming to ASTM A390.
- D. Line Wires: Soft annealed steel with light zinc coated finish not lighter than 16-gage.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
- C. Unfaced Batts and Blankets: Where insulation is cut to fit small or irregular spaces, cut the insulation slightly larger than the space to ensure a tight friction fit. Insert blankets between the studs from the inside face of the wall, recessed slightly from the face of the studs. Where blankets are not adequately supported by friction, attach the blankets with adhesive,

9/16-inch long divergent point staples located at four corners and center of each blanket, or with tie wires spaced not more than 36-inches on center.

- D. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.

3.4 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

06/06/18

SECTION 07 25 00

WEATHER BARRIERS

PART 1 - GENERAL

1.01 SUMMARY OF WORK

- A. This Section specifies self-adhered weather-resistive barriers and accessories.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Sections:
 - 1. Section 06 16 00 – Sheathing: Exterior plywood sheathing substrate for weather-resistive barrier.

1.02 REFERENCE STANDARDS

- A. Air Barrier Association of America (ABAA):
 - 1. ABAA - Installer's Certification Program.
 - 2. ABAA - Water-resistive Barrier Installation Guideline.
- B. American Association of Textile Chemists and Colorists (AATCC):
 - 1. AATCC 127 - Water Resistance: Hydrostatic Penetration Test.
- C. American Architectural Manufacturer's Association (AAMA):
 - 1. AAMA 711 - Voluntary Specification for Self Adhering Flashing Used for Installation of Exterior Wall Fenestration Products.
- D. ASTM International (ASTM):
 - 1. ASTM D1922 - Standard Test Method for Propagation Tear Resistance of Plastic Film and Thin Sheeting by Pendulum Method.
 - 2. ASTM D3462 - Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules
 - 3. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
 - 4. ASTM D5035 - Standard Test Method for Breaking Force and Elongation of Textile Fabrics
 - 5. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 6. ASTM E96/96M - Standard Test Methods for Water Vapor Transmission of Materials.
 - 7. ASTM E154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
 - 8. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials.
- E. Canadian Construction Materials Council (CCMC):
 - 1. CCMC Guide MF07102 (2004-09-03) Sect. 6.4.5. Technical Guide for Sheathing, Membrane, Breather-type.
- F. International Code Council (ICC):
 - 1. AC38, Acceptance Criteria for Water-resistive Barriers.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate work of this Section with work of other trades for proper time and sequence to avoid construction delays.
- B. Pre-installation Meeting: Convene pre-installation meeting after Award of Contract and one week prior to commencing work of this Section to verify project requirements, substrate conditions and coordination with other building sub-trades, and to review manufacturer's written installation instructions.
 - 1. Comply with Section 01 31 19 – Project Meetings and coordinate with other similar pre-installation meetings.
 - 2. Notify attendees 2 weeks prior to meeting and ensure meeting attendees include as minimum:
 - a. Owner.
 - b. Architect.
 - c. Weather-resistive barrier installer.
 - d. Manufacturer's Technical Representative.
 - 3. Ensure meeting agenda includes review of methods and procedures related to weather-resistive barrier installation including co-ordination with related work.
 - 4. Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within 1 week of meeting.

1.04 ACTION SUBMITTALS

- A. Make submittals in accordance with Contract Conditions and Section 01 33 00 - Submittal Procedures.
- B. Product Data: Submit product data including manufacturer's literature for weather-resistive barrier membrane and accessories, indicating compliance with specified requirements and material characteristics.
 - 1. Submit list on weather-resistive barrier manufacturer's letterhead of materials, components and accessories to be incorporated into Work.
 - 2. MSDS report.
 - 3. Include product names, types and series numbers.
 - 4. Include contact information for manufacturer and their representative for this Project.
- C. Samples:
 - 1. Submit duplicate 12 x 12 inch sample of membrane.
 - 2. Submit duplicate 12 inch long samples of seam tape and each type of flashing materials.
- D. Field Reports: Submit manufacturer's field reports within 3 days of each manufacturer representative's site visit and inspection.
- E. Installer Qualifications:
 - 1. Submit verification of manufacturer's approval of installer.

1.05 INFORMATIONAL SUBMITTALS

- A. Test Reports:
 - 1. Submit test reports showing compliance with specified performance characteristics and physical properties including air permeance, water vapor permeance and structural performance.

- B. ICC compliance: Submit current ICC-ES Evaluation Report (ESR) verifying compliance with ICC AC38.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Supply maintenance data for weather-resistive barrier materials for incorporation into manual specified in Section 01 78 23 – Operation and Maintenance Data.
- B. Record Documentation: In accordance with Section 01 78 39 – Record Documents:
 - 1. List materials used in weather-resistive barrier work.
 - 2. Warranty: Submit warranty documents specified.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's approval of installer, and 2 years' experience with work similar to work of this Section.
- B. Mock-up: Construct full size 10 ft x 10 ft mock-up of wall showing weather-resistive barrier using proposed procedures, materials and quality of work where directed by Architect and in accordance with Section 01 45 00 – Quality Control.
 - 1. Include examples of window frame, door frame, interior corner, exterior corner and common protrusions or penetrations of barrier membrane.
 - 2. Purpose: To judge quality of work and material installation.
 - 3. Allow Architect 24 hours minimum notice prior to inspection of mock-up.
 - 4. Do not proceed with work prior to receipt of written acceptance of mock-up by Consultant.
 - 5. When accepted, mock-up will demonstrate minimum standard of quality required for work of this Section.
 - 6. Approved mock-up may remain part of finished work.

1.08 DELIVERY STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Deliver material in accordance with Section 01 60 00 – Materials and Equipment.
 - 2. Deliver materials and components in manufacturer's original packaging with identification labels intact and in sizes to suit project.
- B. Storage and Handling Requirements: Store materials off ground and protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 - 1. Ensure materials are protected from sunlight and UV radiation.
- C. Packaging Waste Management:
 - 1. Separate and recycle waste packaging materials in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
 - 2. Remove waste packaging materials from site and dispose of packaging materials at appropriate recycling facilities.
 - 3. Collect and separate for disposal paper and plastic material in appropriate on-site storage containers for recycling in accordance with Waste Management Plan.

1.09 WARRANTY

- A. Project Warranty: Refer to Contract Conditions and Section 01 78 36 – Warranties for project warranty provisions.
- B. Manufacturer's warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to and not intended to limit other rights Owner may have under Contract Conditions.
 - 1. 10 years limited material warranty.
- C. Warranty period: 1 years commencing on Date of Substantial Completion.

PART 2- PRODUCTS

2.01 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Cosella-Dörken Products Inc., 4655 Delta Way, Beamsville, Ontario, L0R 1B4, Canada, Phone: 1-905-563-3255, Toll Free: 1-888-4DELTA4 (1-888-433-5824), e-mail: info@cosella-dorken.com, URL: <http://www.cosella-dorken.com>.
- B. Acceptable Alternate Products:
 - 1. Dupont; www.tyvek.com; Dupont™ Tyvek® CommercialWrap®.
 - 2. Vaproshield; www.vaproshield.com; Wall Shield Integrated Tape.
 - 3. Substitutions: Section 01 25 13 – Product Options and Substitutions.

2.02 DESCRIPTION

- A. Vapor permeable weather-resistive barrier, highly tear-resistant 3-layer membrane, with 2 outer layers of spun-bonded polypropylene fabric, and water-tight vapor permeable polymeric middle layer.

2.03 DESIGN CRITERIA

- A. Comply with ICC AC308.
- B. Water Vapor Permeance: To ASTM E96 (Procedure A), 69 perms; (Procedure B) 120 perms.
- C. Water Vapor Transmission: To ASTM E96 (Procedure A), 472 g/m²/24 hr; (Procedure B) 820 g/m²/24 hr.
- D. Water Penetration: To AATCC 127, Pass.
- E. Air Permeance: To ASTM E2178, <0.0034 cfm/sq ft @ 0.3 inches wg.
- F. Fastener Pull-through Force: To ASTM D3462, 30 lbs.
- G. Breaking Strength: To ASTM D5035, MD 76 lb/2 in, CD 47 lb/2 in minimum.
- H. Elongation at Break: To ASTM D5035, MD 25 %, CD 65 % minimum.
- I. Trapezoidal Tear Strength: To ASTM D4533, MD 22 lb, CD 15 lb minimum.
- J. Water Penetration Resistance: To CAN/CGSB-4.2 #26.3-95, 253 inches.

- K. Tear Resistance: To ASTM D1922, MD 2.4 lb, CD 3.5 lb.
- L. Fire Rating Characteristics: To ASTM E84:
 - 1. Rating: NFPA Class A, IBC Class A minimum.
 - 2. Flame Spread: 25 maximum.
 - 3. Smoke Developed: 105 maximum.

2.04 MATERIALS

- A. Weather-resistive Barrier for Walls: Vapor permeable weather-resistive barrier; highly tear-resistant 3-layer membrane, with two outer layers of spun-bonded polypropylene fabric and a water-tight polymeric middle layer.
 - 1. Weight: 24 lb/roll nominal.
 - 2. Roll Dimensions: 4 feet 11 inches x 164 feet.
 - 3. Color: Matte Gray.
- B. Basis-of-Design Product: Cosella-Dörken Products Inc., DELTA®-VENT S.

2.05 ACCESSORIES

- A. Seam tape: Acrylic-based adhesive tape in accordance with weather-resistive barrier manufacturer's written recommendations.
 - 1. Acceptable material: Cosella-Dörken Products Inc., DELTA®-MULTIBAND (2-1/2" x 65'-7").
- B. Flashings: Self-adhering, butyl-rubber based weather-resistive flashing membrane in accordance with weather-resistive barrier manufacturer's written recommendations.
 - 1. Acceptable material: Cosella-Dörken Products Inc., DELTA®-FLASHING 4" x 75' and 9" x 75'.
- C. Penetration Flashings: Stretchable butyl-rubber based adhesive on non-woven fabric] flashing membrane in accordance with weather-resistive barrier manufacturer's written recommendations.
 - 1. Acceptable material: Cosella-Dörken Products Inc., DELTA®-FLEXX BAND 4" x 33".
- D. Sealants and Adhesives: Elastomeric sealant and adhesive in accordance with weather-resistive barrier manufacturer's written recommendations, and Section 07 92 00 – Joint Sealants.
 - 1. Ensure sealants are compatible with adjacent materials.
 - 2. Acceptable material: Cosella-Dörken Products Inc., DELTA®-THAN; or Dow Corning® 758.
- E. Window Corner: Prefabricated rubber-compound window corner.
 - 1. Acceptable materials: Cosella-Dörken Products Inc., DELTA®-FAS CORNER.
- F. Fasteners: Water and vapor resistant fasteners in accordance with water- resistive barrier-manufacturer's written recommendations.
 - 1. 1-5/8" corrosion-resistant screw with 2" minimum diameter plastic caps.

2.06 PRODUCT SUBSTITUTIONS

- A. Ensure all accessories such as seam tape, flashing membranes, window corners, and sealants come from same source as weather-resistive barrier membrane.

- B. Substitutions: In accordance with Section 01 25 13 – Product Options and Substitutions.

PART 3 - EXECUTION

3.01 INSTALLERS

- A. Use only Cosella-Dörken Products Inc. authorized installers for work of this Section.

3.02 EXAMINATION

- A. Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for weather-resistive barrier installation in accordance with manufacturer's written recommendations.
 - 1. Visually inspect substrate in presence of Consultant.
 - 2. Inform Consultant of unacceptable conditions immediately upon discovery.
 - 3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.03 PREPARATION

- A. Ensure step flashings and kick-out flashings are installed before beginning installation of weather-resistive membrane.
- B. Ensure protrusions that may penetrate weather-resistive barrier membrane are removed before beginning installation.

3.04 INSTALLATION

- A. Install weather-resistive barrier before installation of windows and doors in accordance with manufacturer's written recommendations.
- B. Do installation in accordance with ABAA written recommendations for installation of weather-resistive barriers.
- C. Unroll weather-resistive barrier with printed side out, wrapping entire building, including rough openings for windows, doors and other protrusions or penetrations.
 - 1. Install weather-resistive barrier plumb and level to exterior face of exterior gypsum board in accordance with manufacturer written recommendations.
 - 2. Ensure weather-resistive barrier is installed with textured side facing substrate.
- D. Start installation of weather-resistive barrier at building corner, leaving 6"-12" of membrane extended beyond corner.
- E. Install horizontally starting at bottom of wall.
 - 1. Overlap weather-resistive barrier membrane as follows:
 - a. Exterior Corners: 12 inches minimum.
 - b. Vertical and horizontal seems: 6 inches minimum.
 - c. Other seams, joints or at protrusions and penetrations: 6 inches minimum.
- F. Sill Plate Interface: Extend lower edge of weather-resistive barrier over sill plate interface 3"– 6".

1. Secure to substrate with elastomeric sealant in accordance with weather-resistive barrier manufacturer's written recommendation.
- G. Attachment of Weather-resistive Barrier Membrane to Substrate:
1. Attach weather-resistive barrier to steel studs through exterior sheathing with mechanical fasteners in accordance with manufacturer's written recommendations.
 - a. Secure using fasteners and custom caps spaced 18 inches maximum vertically on center along stud line and 24 inches maximum on center, horizontally.
 - b. Ensure fasteners penetrate securely through metal studs 3/4 inch minimum.
 - c. Install fasteners 6 inches from sill and frame of window and door openings.
 - d. Ensure fasteners are installed 9 inches minimum from window or door head.

3.05 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with Section 01 45 00 – Quality Control.
- B. Manufacturer's Services:
1. Coordinate manufacturer's services with Section 01 45 00 - Quality Control.
 - a. Have manufacturer review work involved in handling, installation, protection, and cleaning of weather-resistive barrier and components, and submit written reports in acceptable format to verify compliance of Work with Contract conditions.
 2. Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for product installation review in accordance with manufacturer's instructions.
 - a. Report any inconsistencies from manufacturer's recommendations immediately to Consultant.
 3. Schedule site visits to review work at stages listed:
 - a. After delivery and storage of weather-resistive barrier and components, and when preparatory work on which Work of this Section depends is complete, but before installation begins.
 - b. Twice during progress of work at 25% and 60% complete.
 - c. Upon completion of Work, after cleaning is carried out.
 - d. 42 days after installation to ensure weather-resistive barrier has not unnecessarily been left exposed to UV.
 - e. Obtain reports within three days of review and submit immediately to Architect.

3.06 CLEANING

- A. Progress Cleaning: Perform cleanup as work progresses in accordance with Section 01 77 00 – Contract Closeout and Final Cleaning.
1. Leave work area clean at end of each day.
- B. Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 77 00 – Contract Closeout and Final Cleaning.
- C. Waste Management:
1. Co-ordinate recycling of waste materials with 01 74 19 - Construction Waste Management and Disposal.

2. Collect recyclable waste and dispose of or recycle field generated construction waste created during construction or final cleaning related to work of this Section.
3. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.07 PROTECTION

- A. Protect installed products and components from damage during construction.
- B. Repair damage to adjacent materials caused by weather-resistive barrier installation.

END OF SECTION

06/06/18

SECTION 07 42 93

METAL SOFFIT PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes pre-finished, pre-fabricated Factory Manufactured Aluminum Soffit System. All metal trim, accessories, fasteners, and sealants indicated on the drawings are part of this section.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Sections:
 - 1. Section 05 40 00 - Cold-Formed Metal Framing.
 - 2. Section 07 62 00 - Sheet Metal Flashing and Trim.

1.10 REFERENCES

- A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference: Refer to Section 01 42 19 for information concerning availability and use of references.
- B. ASTM International:
 - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 2. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
 - 3. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
 - 4. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
 - 5. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- C. Sheet Metal Air Conditioning Contractors' National Association:
 - 1. SMACNA's "Architectural Sheet Metal Manual."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 2. Accessories: Include details of flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Petersen Aluminum Corp, Tyler, TX, 800-441-8661 products establish a minimum of quality required.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer, with a minimum of five (5) years experience in this type of project.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Protect strippable protective coating on any metal coated product from exposure to sunlight and high humidity, except to the extent necessary for material installation.

1.8 PROJECT CONDITIONS

- A. Weather Limitations: proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed.
- B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication

1.9 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

- A. Section 01 77 00 - Closeout Procedures: Requirements for warranties.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal soffit panels that show evidence of deterioration of factory-applied finish within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes the following:
 - a. Color fading 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 a paint to adhere to a bare metal.
 - 2. Finish Warranty Period: 20 Years from the date of substantial completion.

PART 2 - PRODUCTS

2.1 SOFFIT SYSTEM PERFORMANCE TESTING

- A. Soffit System shall be designed to meet 2016 California Building Code wind load requirements.
- B. Soffit System shall have been tested by the Manufacturer per ASTM E-330 and have the applicable Load Tables published from this Air Bag testing for negative loads.

2.2 ACCEPTABLE MANUFACTURERS

- A. Basis-of-Design Manufacturer: Petersen Aluminum Corporation, Tyler, TX, 800-441-8661, Model: PAC-750 Soffit Panels.
- B. Other acceptable manufacturers, if they comply with specification:
 - 1. IMETCO, Tucker, GA, Soffit Panel only.
 - 2. ATAS Aluminum, Allentown, PA, "Wind-Lock" Panel only.
- C. Substitutions: The material, products and equipment specified in this section establish a standard for required function, dimension, appearance and quality to be met by any proposed substitution.

2.3 PANEL DESIGN

- A. Basis-of-Design product: Peterson Aluminum Corporation, PAC-750 Soffit Panels.
 - 1. Panel Profile: 12" wide by 1/2" deep, with linear V-groove at mid span of panel.
 - 2. Manufacturer shall be able to provide all three options of panel surface: Full Vent, Half Vent or Solid Soffit in the specified color (s).

2.4 MATERIALS

- A. Materials: ASTM B-209 quality aluminum, 3105-H14 Alloy and Temper material. Aluminum shall be tension leveled (temper passed and stretcher leveled) with camber of a maximum of 1/4" in 20 feet, manufactured in the USA, and shall be 0.032" thick aluminum, US standard grade.
 - 1. Color: PAC-CLAD Kynar 500 *Standard Pac-Clad Finish. Color as selected by Architect.
 - 2. Panel Surface shall be: Full Vent, Half Vent, or Solid as shown on drawings.
- B. Forming: Use continuous and rolling method. No end laps on panels. No "portable rollforming" machines will be permitted on this project; no installer-owned or installer-rented machines shall be permitted. It is the intent of the Architect to provide Factory-Manufactured soffit systems only for this project.
- C. Trim: Fabricate trim of the same material and finish to match the profiled sheeting and press broken in lengths of 10 - 12 feet. Trim shall be formed only by the manufacturer or their approved dealer. Erect trim in overlapped condition. Use lap strips only as indicated on drawings. Miter conditions shall be factory welded material to match the sheeting.
- D. Fasteners: 400 series stainless steel, dished washers stainless steel with bonded neoprene.
- E. Zees: Where required by design of primary structural framing system, zees shall be used to span between beams and/or other joists. Thermally responsive base and top clips shall be fastened to the zees on 12" centers.

2.5 SEALANTS

- A. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are non-staining, and do not damage panel finish.
 - 1. Two-part polysulfide class B non-sag type for vertical and horizontal joints; or
 - 2. One part polysulfide not containing pitch or phenolic extenders; or
 - 3. Exterior grade silicone sealant recommended by roofing manufacturer; or
 - 4. One part non-sag, gun grade exterior type polyurethane recommended by the roofing manufacturer.

2.6 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Comply with dimensions, profile limitations, gauges and fabrication details shown and if not shown, provide manufacturer's standard product fabrication.
- C. Fabricate components and assemble units to comply with fire performance requirements specified.
- D. Apply specified finishes in conformance with manufacturer's standard, and according to manufacturer's instructions.

2.7 FINISHES

- A. Finish: Kynar 500 or Hylar 5000 Fluorocarbon coating with a top side film thickness of 0.70 to 0.90 mil over 0.25 to 0.31 mil prime coat to provide a total dry film thickness of 0.95 to 1.25 mil. Finish shall conform to tests for adhesion, flexibility and longevity as specified by Kynar 500 or Hylar 5000 finish supplier.
- B. Field protection must be provided by the Contractor at the job site so material is not exposed to weather and moisture.
- C. If any strippable film coating is applied to any pre-finished panels or materials for protection during shipping, strippable film shall be removed prior to installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
- B. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.
- C. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- D. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 FASTENERS

- A. Secure units to supports
- B. Place fasteners as indicated in manufacturer's standards.

3.3 METAL PANEL INSTALLATION

- A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving metal panels.
 - 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.

5. Install flashing and trim as metal panel work proceeds.
 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
1. Apply panels and associated items true to line for neat and weathertight enclosure.
 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
- E. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
- F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling, and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- G. Remove all strippable coating and provide a dry-wipe down cleaning of the panels as they are erected.
- H. Panels attached to any treated lumber must have an appropriate vapor barrier installed over the treated lumber prior installing any soffit panels or related flashings. Do not allow any metal products to come into direct contact with treated lumber.

3.4 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, prior to metal panel installation unless otherwise indicated in manufacturer's written installation instructions. On

completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

06/06/18

SECTION 07 52 00

MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. The work under this contract shall include all, labor, materials, tools, transportation, equipment, services, and facilities necessary for, and reasonably incidental to, the completion of the work as shown on the drawings and/or described in the specifications, for the following scope of work:
 - 1. Roof installation scope of work:
 - a. Mechanically attach insulation.
 - b. Install base ply in hot asphalt.
 - c. Install a modified bitumen cap sheet.
 - d. Fabricate and install all new sheet metal.
 - e. Install a base sheet and a mineral surfaced modified membrane at all perimeter and projection baseflashings.
 - f. Coat all roof and flashing surfaces.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Sections
 - 1. Section 07 62 00 – Sheet Metal Flashing and Trim.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM B69 - Standard Specification for Zinc Sheet.
 - 2. ASTM D41 - Specification for Asphalt Primer Used in Roofing, Damp proofing, and Waterproofing.
 - 3. ASTM D312- Specification for Asphalt Used in Roofing.
 - 3. ASTM D5147 - Test Method for Sampling and Testing Modified Bituminous Sheet Materials
 - 4. ASTM E108 - Test Methods for Fire Test of Roof Coverings.

1.3 PREINSTALLATION MEETING

- A. Pre-application Roofing Conference: Approximately 2 weeks before scheduled commencement of modified bituminous membrane roofing system and associated work, meet at Project site with Installer, installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in the around roofing that must precede or follow roofing work (including mechanical work if any), Owner's representative/Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, test agencies, and governing authorities. Objectives to include:
 - 1. Review foreseeable methods and procedures related to roofing work.

2. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations, and other preparatory work performed by other trades.
3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
4. Review roofing systems requirements (drawings, specifications, and other contract documents).
5. Review required submittals, both completed and yet to be completed.
6. Review and finalize construction schedule related to roofing work and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
7. Review required inspection, testing, certifying, and material usage accounting procedures.
8. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not a mandatory requirement).
9. Record (contractor) discussion of conference, including decisions and agreements (or disagreements) reached, and furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.
10. Review notification procedures for weather or non-working days.

1.4 ACTION SUBMITTALS

- A. Product Data: Provide manufacturer's technical product data for each type of roofing product specified. Include data substantiating that materials comply with specified requirements. Include data substantiating that materials comply with the minimum specified requirements including rubber content, low temperature flexibility, tensile strength, tear strength, and amount of recycled content (post consumer and post industrial).
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:
 1. Base flashings and membrane terminations.
 2. Insulation, including slopes.
 3. Crickets, saddles, and tapered edge strips, including slopes.
- C. Samples: Submit four (4) samples of the following:
 1. Cap Sheet.
 2. SBS Modified Base Sheet.
- D. Specimen Warranty: Provide an unexecuted copy of the 30 year No Dollar Limit water tight warranty covering every part of the Built Up Roofing system specified for this Project, identifying the terms and conditions required of the Manufacturer and the Owner.
- E. Any material submitted as equal to or better than the specified material must be accompanied by a report signed and sealed by a professional engineer licensed in the state in which the installation is to take place. This report shall show that the submitted equal meets the Design and Performance criteria in this specification.

- F. Substitution requests submitted without licensed engineer stamp will be rejected for non-conformance.

1.5 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Installation Instructions: Submit installation instructions and recommendations indicating special precautions required for installing the membrane.
- B. Manufacturer's Certificate: Certify that roof system furnished is approved by Factory Mutual, Underwriters Laboratories, Warnock Hersey or approved third party testing facility in accordance with ASTM E108, Class A for external fire and meets local or nationally recognized building codes.
- C. Manufacturer's Certificate: Certify that the roof system furnished is approved or accepted by Factory Mutual Approval Standard 4470.
- D. Manufacturer's Certificate: Certify that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.
- E. Manufacturer's Certificate: Submit a certified copy of the roofing manufacturer's ISO 9001 compliance certificate.
- F. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, indicating compliance with ASTM D5147.
- G. Written certification from the roofing system manufacturer certifying the applicator is currently authorized for the installation of the specified roof system.
- H. Design Wind Loads: Submit copy of manufacturer's minimum design load calculations according to ASCE 7-10, Method 2 for Components and Cladding, sealed by a registered professional structural engineer employed by the system manufacturer as a full-time staff engineer. In no case shall the design loads be taken to be less than those detailed in Design and Performance Criteria article of this specification.
- I. Qualification data for firms and individuals identified in Quality Assurance Article below.
- J. Notarized statement from the Roofing System Manufacturer, signed by an Officer of the Corporation with the Corporate Seal affixed there to stating that the Roofing System Manufacturer will provide field inspections three times a week during the entire period of installation until all construction is completed and to be performed by a full time employee of the manufacturer at no additional cost to the owner.

1.6 CLOSEOUT SUBMITTALS

- A. General: Comply with Requirements of Section 01 77 00 – Contract Closeout and Final Cleaning; Submittals.
- B. Special Project Warranty: Provide specified warranty for the Project, executed by the authorized agent of the Manufacturer.
- C. Roofing Maintenance Instructions. Provide a manual of manufacturer's recommendations for maintenance of installed roofing systems.

- D. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.
- E. Demonstration and Training Schedule: Provide a schedule of proposed dates and times for instruction of Owner's personnel in the maintenance requirements for completed roofing work. Refer to Part 3 for additional requirements.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Installer (Roofing) shall be specializing in modified bituminous roof application with minimum 5 years experience and who is certified by the roofing system manufacturer as qualified to install manufacturer's roofing materials.
- B. It is the intent of this specification to provide a roof system with an external fire rating. The descriptions given below are general descriptions. The insulation, recovery board, and other components shall be as required by the membrane manufacturer to provide a Class A fire resistance rating.
- C. Installer's Field Supervision: Require Installer to maintain a full-time Supervisor/Forman on the job site during all phases of modified bituminous sheet roofing work and at any time roofing work is in progress: proper supervision of workmen shall be maintained. A copy of the specification shall be in the possession of the Supervisor/Foremen and on the roof at all times.
- D. It shall be the Contractor's responsibility to respond immediately to correction of roof leakage during construction.
- E. Disqualification of Bidders: A Bidder can be disqualified by the Owner's representative or Owner for any of the following reasons, but not limited to:
 - 1. The failure to attend the Pre-Bid conference at the time and place so described under Bidding Dates.
 - 2. Incorrect use of the "Proposal" as provided by the Owner's representative/Owner. Any changes in said format shall be accepted by the Owner's representative/Owner only when requested and approved in writing prior to the bid opening. Changes in the Proposal after the opening of the bids will not be accepted.
 - 3. Lack of proficiency as shown by past work or incomplete work under other contracts which, in the judgment of the Owner's representative/Owner, might hinder or prevent the prompt completion of additional work if so awarded or any involvement in any legal actions which relate to past or present performance. This includes, but is not limited to, law suits, court appointed actions, and/or ongoing litigation.
- F. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance on roofing and associated work.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.
- B. Store and handle roofing sheets in a dry, well-ventilated, weather-tight place to ensure no possibility of significant moisture exposure. Store rolls of felt and other sheet materials on

pallets or other raised surface. Stand all roll materials on end. Cover roll goods with a canvas tarpaulin or other breathable material (not polyethylene).

- C. Do not leave unused rolled goods on the roof overnight or when roofing work is not in progress unless protected from weather and other moisture sources.
- D. Handle and store materials or equipment in a manner to avoid significant or permanent deflection of deck.

1.9 MANUFACTURER'S INSPECTIONS

- A. When the project is in progress, the Roofing System Manufacturer will provide the following:
 - 1. Keep the Owner's representative informed as to the progress and quality the work as observed.
 - 2. Provide job site inspections a minimum of three days a week.
 - 3. Report to the Owner's representative in writing, any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
 - 4. Confirm, after completion of the project and based on manufacturer's observations and tests, that manufacturer has observed no applications procedures in conflict with the specifications other than those that may have been previously reported and corrected.

1.10 PROJECT CONDITIONS

- A. Weather Condition Limitations: Do not apply roofing membrane during inclement weather or when a 40% chance of precipitation is expected.
- B. Do not apply roofing insulation or membrane to damp deck surface.
- C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.
- D. Proceed with roofing work only when existing and forecasted weather conditions will permit unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements.

1.11 SEQUENCING AND SCHEDULING

- A. Sequence installation of modified bituminous sheet roofing with related units of work specified in other sections to ensure that roof assemblies, including roof accessories, flashing, trim, and joint sealers, are protected against damage from effects of weather, corrosion, and adjacent construction activity.
- B. All work must be fully completed on each day. Phased construction will not be accepted.

1.12 WARRANTY

- A. Membrane Manufacturer upon completion of installation, and acceptance by the Owner and Owner's representative, the manufacturer will supply to the Owner a 30 year labor and material warranty.

- B. Contractor will submit a minimum of a two year warranty to the membrane manufacturer with a copy directly to Owner.

PART 2 - PRODUCTS

2.1 GENERAL

- A. When a particular trade name or performance standard is specified it shall be indicative of a standard required. Provide materials by: The Garland Company, Jay Mulligan, (415) 971-2739 (Basis-of-Design) or approved equal from Firestone Building Products, GAF, Johns Manville, Siplast, Soprema, Inc., or Tremco Incorporated.
- B. Any item or materials submitted as an alternate to the manufacturer specified must comply in all respects as to the quality and performance, including job site investigation of the brand name specified. The Owner's representative/Owner shall be the sole judge as to whether or not an item submitted as an equal is truly equal. Should the contractor choose to submit on the equal basis, he shall assume all risk involved, monetary or otherwise, should the Owner's representative/Owner find it unacceptable.

2.2 DESIGN AND PERFORMANCE CRITERIA

- A. Uniform Wind Uplift Load Capacity:
 - 1. Installed roof system shall withstand negative (uplift) design wind loading pressures complying with the following criteria. Attachment shall be installed exactly as given in Part 3. (To be included with bid documents)
 - a. Design Code: ASCE 7-10, Method 2 for Components and Cladding.
 - b. Risk Category: III.
 - c. Wind Importance Factor: 1.0.
 - d. Wind Speed: 120 MPH.
 - e. Exposure Category: C

2.3 ROOF INSULATION

- A. Rigid polyisocyanurate board, with a strong white or black fibrous glass facer conforming to or exceeding the requirements of ASTM C 1289 / FS HH-I-1972. EnergyGuard™ Polyiso Insulation, with the following characteristics:
 - 1. Board Thickness: As indicated. Available in a variety of thicknesses, from 1/2-inch to 4.6 inches.
 - 2. Thermal Resistance (LTTR value) of: R5.6 per inch.
- B. Tapered rigid polyisocyanurate board, with a strong white or black fibrous glass facer conforming to or exceeding the requirements of ASTM C 1289 / FS HH-I-1972. EnergyGuard™ Tapered Polyiso Insulation, with the following characteristics:
 - 1. Board Thickness: Tapered.
 - 2. Thermal Resistance (LTTR value) of: Varies.

2.4 SUBSTRATE BOARD (ROOF COVER BOARD)

- A. DensDeck® Prime, as manufactured by Georgia-Pacific; www.georgiapacific.com
 - 1. 1/2" thickness.

2. Width: 4 feet.
3. Length: 8 feet.
4. Surfacing: Fiberglass mat with non-asphaltic coating.

2.5 MEMBRANE ROOFING

- A. Materials: Insulation, modified base sheet, and modified capsheet membrane and surfacing.
 1. Base Ply: the smooth surfaced modified membrane will be: Stressbase 80, SBS modified base sheet.
 2. Modified Membrane: Stressply Plus FR Mineral. Dual reinforced, fire resistant, SBS modified bitumen.
 3. Base flashing base ply: HPR Tribase.
 4. Flashing capsheet: 135 mil mineral surfaced modified membrane.

2.6 MODIFIED BITUMEN MEMBRANE PERFORMANCE REQUIREMENTS

- A. Tensile Strength, ASTM D 5147:
 1. 2 in/min. @ 73.4 ± 3.6 °F MD 200 lbf/in XD 200 lbf/in
- B. Tear Strength, ASTM D 5147:
 1. 2 in/min. @ 73.4 ± 3.6 °F MD 300 lbf XD 300 lbf
- C. Elongation at Maximum Tensile, ASTM D 5147
 1. 2 in/min. @ 73.4 ± 3.6 °F MD 3.5% XD 3.5%
- D. Low Temperature Flexibility, ASTM D 5147, Passes -30 degreesF (-34

2.7 BITUMINOUS MATERIALS

- A. Primer: V.O.C. compliant, ASTM D-41.
- B. Asphalt Roofing Mastic: V.O.C. compliant, Silver Flash, ASTM D-2822, Type II.
- C. Asphalt: ASTM D312, Type IV.

2.8 RELATED MATERIALS

- A. Caulking and sealant: Tuff-Stuff urethane caulking.
- B. Zinc pipe flashing: ASTM B69, 99.95% pure zinc. Zincjak: Commercial Innovations, www.commercialinnovations.com.
 1. Thickness: 0.02".
 2. Pipe flashing: Interior coated.
 3. Lead free solder for zinc: SN 100C, Aim Solder, <http://www.aimsolder.com>
 4. Flux for zinc: #17 or #70, Superior Flux Mfg. Co., www.superiorflux.com

2.9 SURFACING

- A. White Elastomeric Roof Coating: Pyramic; Energy Star approved white acrylic roof coating as indicated on drawings:
 - 1. Reflectance 81%.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrate surfaces to receive modified bitumen sheet roofing system and associated work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing modified bitumen roofing system.
- B. Insurance/Code Compliance: Where required, install and test modified bitumen roofing system to comply with governing regulations and specified insurance requirements.
- C. Protect other work from spillage of modified bitumen roofing materials, and prevent liquid materials from entering or clogging drains and conductors. Replace or restore other work damaged by installations of modified bituminous roofing system work.
- D. Coordinate installing roofing system components so that insulation and roofing plies are not exposed to precipitation or left exposed overnight. Provide cut offs at end of each day's work to cover exposed ply sheets with two (2) plies of #15 organic felt set in mastic and with joints and edges sealed with roofing cement. Remove cut offs immediately before resuming work.
- E. Substrate Joint Penetrations: Prevent bitumen from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.
- H. Apply roofing materials as specified herein unless recommended otherwise by manufacturer's instructions. Keep roofing materials dry before and during application. Do not permit phased construction. Complete application of roofing plies, modified sheet and flashing in a continuous operation. Begin and apply only as much roofing in one day as can be completed that same day.

3.3 INSULATION AND BASE SHEET ATTACHMENT

- A. General:
 - 1. Mechanically attach base layer of insulation with screws and plates per manufacturer's wind uplift calculation.
 - 2. All subsequent layers and cover board insulation shall be installed in hot asphalt.
- B. Install roof insulation in not less than 2 layers with joints of each succeeding layer parallel and offset in both directions with respect to the layer below.

- C. Install only as much insulation as can be completely covered with roofing on the same day. At the end of each days work, seal the edges of the insulation with 18-inch wide strips of felt adhered with either hot asphalt or plastic roof cement to both the deck and the completed roof membrane. Remove these strips before continuing application of insulation.
- D. First Layer on Metal Decks: Apply first layer of insulation board directly to metal deck and secure it to deck with fasteners spaced as recommended by the manufacturer to meet Underwriters Laboratories or Factory Mutual 1-90 wind uplift requirements. Insulation joints parallel to ribs of deck shall occur on solid surfaces only, not over open ribs.
- E. Subsequent Layer(s): Install additional layer(s) of insulation board as necessary to achieve the specified R-value or thickness. Apply insulation in a mopping of hot asphalt applied at the rate of 25-pounds per 100-square feet.
- F. Cover Boards: Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.
 - 1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - 2. Cut and fit cover board tight to nailers, projections, and penetrations.
 - 3. Adhere cover board to substrate using hot asphalt.

3.4 BASE PLY INSTALLATION

- A. Base ply: Install base ply shingled uniformly to achieve one ply throughout over the prepared substrate. Shingle in proper direction to shed water on each area of roof.
- B. Stagger end laps twelve inches minimum.
- C. Extend ply two inches beyond top edges of cants at wall and projection bases.
- D. Install base flashing ply to all perimeter and projections details.

3.5 MODIFIED MEMBRANE APPLICATION

- A. Starting at the low point, apply StressPly IV UV Mineral in the desired position.
- B. Care should be taken to eliminate air entrapment under the membrane.
- C. Apply pressure to all seams to ensure that the laps are solidly bonded to substrate.
- D. Subsequent rolls of modified shall be installed across the roof as above with a minimum of 4" side laps and 8" end laps. The end laps shall be staggered. The modified membrane shall be laid in the same direction as the underlayers, but the laps shall not coincide with the laps of the base layers. Adhere all end laps with mastic.
- E. Extend membrane 2" beyond top edge of all cants in full moppings of the specified asphalt as shown on the drawings.
- F. Seal top of membrane at end of each day.
- G. Base and should be installed same day.

3.6 FLASHING MEMBRANE APPLICATION (GENERAL)

- A. All curb, wall and parapet flashings shall be sealed with an application of mastic and mesh on a daily basis. No condition should exist that will permit moisture entering behind, around, or under the roof or flashing membrane.
- B. Prepare all walls, penetrations and expansion joints to be flashed and where shown on the drawings, with asphalt primer at the rate of one gallon per 100 square feet. Allow primer to dry tack free.
- C. The modified membrane will be used as the flashing membrane and will be adhered to an underlying base flashing ply and nailed off 8" O.C. at all vertical surfaces. Over 12" the modified membrane will be 80 mils with a mineral cap sheet installed over the top.
- D. The entire sheet of flashing membrane must be solidly adhered to the substrate.
- E. Seal all vertical laps of flashing membrane with a three course application of Flashing Bond and fiberglass mesh.
- F. Counter flashing, cap flashings, expansion joints, and similar work to be coordinated with modified bitumen roofing work are specified in other sections.
- G. Roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices to be coordinated with modified bituminous roof system work are in other sections.
- H. Ensure all flashing are nailed off and sealed with a three course application of mastic and mesh.

3.7 APPLICATION OF SURFACING

- A. Prior to installation of surface, obtain approval from manufacturer as to work completed.
- B. Apply Pyramic at two gallons per sq. per coat. Apply two coats.

3.8 CLEANING

- A. Remove drippage of bitumen from all walls, windows, floors, ladders, and finished surfaces.
- B. In areas where finished surfaces are soiled by asphalt or any other sources of soiling caused by work of this section, consult manufacturer of surfaces for cleaning advice and conform to their instructions.

3.9 FINAL INSPECTION

- A. At completion of roofing installation and associated work, meet with Installer, installer of associated work, Owner, roofing system manufacturer's representative, and other representatives directly concerned with the performance of the roofing system.
- B. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party attending.
- C. The Roofing System Manufacturer reserves the right to request a thermographic scan of the roof during final inspection to determine if any damp or wet materials have been installed. The thermographic scan shall be provided by the Roofing Contractor at a negotiated price.

- D. If core cuts verify the presence of damp or wet materials, the Roofing Contractor shall be required to replace the damaged areas at his own expense.
- E. Repair or replace (as required) deteriorated or defective work found at time above inspection to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- F. The Contractor is to notify the Owner upon completion of corrections.
- G. Following the final inspection, acceptance will be made in writing by the material manufacturer.

END OF SECTION

06/06/18

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manufactured reglets with counterflashing.
2. Formed roof-drainage sheet metal fabrications.
3. Formed low-slope roof sheet metal fabrications.
4. Formed wall sheet metal fabrications.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Sections:

1. Section 05 50 00 "Metal Fabrications" for steel pipe downspouts.
2. Section 06 10 00 "Rough Carpentry" for wood nailers, curbs, and blocking.
3. Section 07 52 16 "Cold Process Modified Bitumen Membrane Roofing" for sheet metal flashing and trim integral with roofing.

1.2 REFERENCES

A. The editions of standards and specifications published by the following organizations, and referenced herein, apply to the work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

ASTM International
National Roofing Contractors Association (NRCA)
Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
U.S. General Services Administration Federal Specifications (FS)

1.3 COORDINATION

- ###### A. Secure field measurements required for proper and adequate fabrication and installation of the work.
- ###### B. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- ###### C. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Attendees: Owner, Architect, Contractor, IOR, representatives of the applicators and materials manufacturers of the insulation and membrane roofing systems, and the sheet metal installer.

2. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
4. Review requirements for insurance and certificates if applicable.
5. Review sheet metal flashing observation and repair procedures after flashing installation.
6. The conference shall assure a clear understanding of the drawings and specifications, resolve possible conflicts and establish coordination between all parties involved.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of roof-penetration flashing.
8. Include details of edge conditions, including eaves, rakes, crickets, and counterflashings as applicable.
9. Include details of gutters, downspouts, and scuppers.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches.

C. Samples: If specifically requested for specified products; required for alternate products.

1. For each type of sheet metal and accessory indicated with factory-applied finishes.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
 - 1. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.3 UNDERLAYMENT MATERIALS

- A. Paper Slip Sheet: 5-pound rosin-sized building paper.
- B. Waterproofing Sheet Underlayment: Minimum 35-mil thick aluminum foil backed, synthetic rubber based self-adhering sheet. Acceptable products or equal:

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - 2. Nails: Use case-hardened concrete nails over concrete and roofing nails over wood, of required lengths. Where sheet metal is built in over roofing materials or other sheet metal, use nails with 1 inch tinned discs.
 - 3. Rivets: Tinned soft iron rivets.
 - 4. Sheet Metal Screws: Self-tapping type, of proper size and material to suit conditions. Where wood nailers are provided, use galvanized or stainless steel wood screws as applicable.
 - 5. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 6. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- C. Solder:
 - 1. For Zinc-Coated (Galvanized Steel): ASTM B32, 95-5 tin/antimony solder, with rosin flux.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: Where it is impractical to use a solder at joints and corners, seal with a butyl sealant. ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement. Acceptable products or equal:

Garland Butyl Sealant
Tremco; Butyl Sealant

- G. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
- H. Modified Bitumen Flashing Cement: Two-component elastomeric compound. Acceptable products or equal:
- Johns Manville; MBR Flashing Cement Base
Celotex Roofing Products Division; SBS Modified Flashing Adhesive
- I. Non-Shrink Grout: Premixed, nonmetallic, non-corrosive, non-staining grouting compound containing silica sands, portland cement, shrinkage compensating agents and water reducing agents, meeting the requirements of ASTM C1107. Acceptable products or equal:
- Gifford Hill & Co., Inc.; Supreme
Master Builders; Masterflow 713
The Upco Company; Upcon Nonshrink

2.5 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated, with factory-mitered and -welded corners and junctions, and with interlocking counterflashing on exterior face, of same metal as reglet.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Springlock Flashing System products from Fry Reglet Corp., or comparable products by one of the following:

W.P. Hickman Company
Substitutions: Section 01 25 13 – Product Options and Substitutions.
 2. Material: Aluminum, 0.025 inch thick.
 3. Surface-Mounted Type: Fry Reglet Type "SM". Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
 4. Accessories:
 - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
 5. Finish: Manufacturer's standard Polyester grey coating.

2.6 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 2. Obtain field measurements for accurate fit before shop fabrication.
 3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- G. Seams for metals being soldered: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- H. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.
- I. Seams for metals with painted finishes: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- J. Do not use graphite pencils to mark metal surfaces.
- K. Separations: Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by fabricator.

2.7 ROOF-DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch long sections. Furnish flat-stock gutter spacers and straps fabricated from same metal as gutters, of size and thickness as indicated. Fabricate expansion joints, expansion-joint covers, and gutter accessories from metals indicated. Shop fabricate interior and exterior corners.
 - 1. Fabricate of 0.032" aluminum.
 - 2. Gutter Profile: As shown on drawings.
 - 3. Lap joints between sections 1-1/2 inches, rivet and solder.
 - 4. Expansion Joints: Provide loose locked expansion joints midway between outlet tubes to provide for 1-1/2 inch movement in both directions.
 - 5. Provide expansion joints with cover strips in a manner to provide free movement and watertight connection. Fabricate expansion joint cover strips of 22 gauge stainless steel, Type 316.
 - 6. Form outlet tubes of same material and thickness as gutter and lock and solder the longitudinal seam.
 - 7. Flange the upper end of tubes and rivet and solder to the lining.
 - 8. Extend tubes into downspouts at least 3-inches.
 - 9. Accessories: Provide outlets with tight fitting stainless steel wire ball strainers.

11. Support gutters with 3/16" x 1" wide aluminum gutter straps (spacers) at 18 inches on center maximum.
- B. Downspouts: Steel pipe downspouts as specified in Section 05 50 00.
 1. Diameter: As indicated.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing and Fascia Cap: Fabricate in minimum 96-inch long, but not exceeding 12-foot long sections. Furnish with 6-inch wide, joint cover plates. Shop fabricate interior and exterior corners.
 1. Joint Style: Butted with expansion space and 6-inch wide, exposed cover plate.
 2. Seal laps with butyl sealant.
 3. Fold back exposed edges of roof edge flashing 1/2-inch on the underside.
 4. Place roof edge flashing on roofs after roof membrane layer has been laid.
 5. Place in position on a 1/8-inch thick bed of black plastic cement the full width of the flange and fasten as indicated not to exceed 12-inches on center.
 6. Fabricate from the Following Materials:
 - a. Aluminum, 0.032 inch thick.

2.8 WALL SHEET METAL FABRICATIONS

- A. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch high, end dams. Fabricate from the following materials:
 1. Galvanized Steel: 0.040 inch thick.
 2. Aluminum Sill Pan/End Dam Flashing: 0.040 inch thick.
 3. Aluminum Brake Metal Flashing at Storefront Jambs: 0.080 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 1. Verify compliance with requirements for installation tolerances of substrates.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Check base flashings to ensure that they extend at least 9 inches above the toe of cant and are securely fastened to the structure.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller. Cover underlayment within 14 days.
- B. Apply slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.

3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 - 5. Torch cutting of sheet metal flashing and trim is not permitted.
 - 6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 - 1. Coat concealed side of sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws and for other substrates not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not use torches for soldering.
 2. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 3. Stainless-Steel soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
- H. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.4 ROOF-DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.
1. Fasten gutter spacers to front and back of gutter.
 2. Anchor gutter with straps spaced not more than 18 inches apart. Fasten back of strap to roof fascia, and loosely lock to front gutter bead.
 3. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.
- C. Downspouts: Install per Section 05 50 00 "Metal Fabrications".

3.5 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

- D. Reglets and Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches. Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant.
- E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric or butyl sealant and clamp flashing to pipes that penetrate roof.

3.6 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Opening Flashings in Frame Construction: Install continuous sheet metal head flashing assembly at door frames and similar openings to extend 4 inches (or as shown on drawings) beyond wall openings at jamb.

3.7 MISCELLANEOUS FLASHING INSTALLATION

- A. Flashing at Roof Penetrations:
 - 1. Provide metal flashing for all pipes, ducts, conduits, equipment supports, and vent stacks projecting through the roof surface as indicated and required.
 - 2. Refer to Section 07 52 00 for flashing material and installation at Modified Bituminous Membrane Roofing.
- B. Miscellaneous Flashings and Metal Trim: Miscellaneous flashings, metal trim, and their related components are not necessarily individually described. Furnish miscellaneous items and trim not mentioned or described in accordance with the intent of the drawings and specifications and as required to complete the work.

3.8 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.9 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.10 SHOP PAINTING

- A. Treat sheet metal surfaces which will be concealed in the finished work with an approved acid wash and then shop paint with one coat of an approved galvanized primer such as zinc dust-zinc oxide primer. Unfinished sheet metal surfaces that will be exposed in the finished work are specified to be treated and prime-painted under Section 09 91 00.

END OF SECTION

06/08/18

SECTION 07 71 29

MANUFACTURED ROOF EXPANSION JOINTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Aluminum roof expansion joints.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Requirements:

1. Section 06 10 53 "Miscellaneous Rough Carpentry" for wooden curbs or cants for mounting roof expansion joints.
2. Section 07 62 00 "Sheet Metal Flashing and Trim" for shop- and field-fabricated sheet metal expansion-joint systems, flashing, and other sheet metal items.

1.2 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.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roof expansion joints.

1. Include plans, elevations, sections, and attachment details.
2. Include details of splices, intersections, transitions, fittings, method of field assembly, and location and size of each field splice.
3. Provide isometric drawings of intersections, terminations, changes in joint direction or planes, and transition to other expansion joint systems depicting how components interconnect with each other and adjacent construction to allow movement and achieve waterproof continuity.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

- B. Sample Warranties: For special warranties.

1.5 WARRANTY

- A. Special Warranty: Manufacturer and Installer agree to repair or replace roof expansion joints and components that leak, deteriorate beyond normal weathering, or otherwise fail in materials or workmanship within specified warranty period.

1. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint seals, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F ambient; 180 deg F, material surfaces.

2.2 ALUMINUM ROOF EXPANSION JOINTS

- A. Aluminum Roof Expansion Joint: Factory-fabricated, continuous, waterproof, joint cover; consisting of a formed or extruded metal cover secured to extruded aluminum frames, with water-resistant gasketing between cover and frames, and with provision for securing assembly to substrate and sealing assembly to roofing membrane or flashing.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Balco, Inc.; www.balcoinc.com
- b. C/S Group; www.c-sgroup.com
- c. InPro Corporation (IPC); www.inprocorp.com
- d. MM Systems Corporation; www.mmsystemscorp.com
- e. Nystrom, Inc.; www.nystrom.com

2. Joint Movement Capability: Plus and minus 50 percent of joint size.
3. Frame Members: Extruded aluminum configured for sloped cants as indicated; with exposed finish matching cover.
4. Cover: Formed or extruded aluminum.
5. Corner, Intersection, and Transition Units: Provide factory-fabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints.
6. Accessories: Provide splicing units, adhesives, and other components as recommended by roof-expansion-joint manufacturer for complete installation.
7. Secondary Seal: Continuous, waterproof membrane within joint and attached to substrate on sides of joint below the cover.

- a. Drain-Tube Assemblies: Equip secondary seal with drain tubes and seals to direct collected moisture to drain.

- B. Basis-of-Design Product: Balco, Inc.; Model LPRE-3-6, Roof-to-Wall Cover.

2.3 MATERIALS

- A. Galvanized-Steel Sheet: ASTM A 653/A 653M, hot-dip zinc-coating designation G90.
- B. Aluminum: ASTM B 209 (ASTM B 209M) for sheet and plate, ASTM B 221 (ASTM B 221M) for extrusions; alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.
 - 1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious or preservative-treated wood materials.
 - 2. Mill Finish: As manufactured.
- C. EPDM Membrane: ASTM D 4637, Type standard with manufacturer for application.
- D. PVC Membrane: ASTM D 4434, Type standard with manufacturer for application.
- E. Silicone Extrusions: ASTM D 2000, UV stabilized, and that does not propagate flame.
- F. Adhesives: As recommended by roof-expansion-joint manufacturer and that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- G. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.
 - 1. Exposed Fasteners: Gasketed. Use screws with hex washer heads matching color of material being fastened.
- H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 MISCELLANEOUS MATERIALS

- A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.
 - 1. Exposed Fasteners: Gasketed. Use screws with hex washer heads matching color of material being fastened.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joint openings, substrates, and expansion-control joint systems that interface with roof expansion joints, for suitable conditions where roof expansion joints will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions for handling and installing roof expansion joints.

1. Anchor roof expansion joints securely in place, with provisions for required movement. Use fasteners, protective coatings, sealants, and miscellaneous items as required to complete roof expansion joints.
 2. Install roof expansion joints true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
 3. Provide for linear thermal expansion of roof expansion joint materials.
 4. Provide uniform profile of roof expansion joint throughout its length; do not stretch or squeeze membranes.
 5. Provide uniform, neat seams.
 6. Install roof expansion joints to fit substrates and to result in watertight performance.
- B. Directional Changes: Install factory-fabricated units at directional changes to provide continuous, uninterrupted, and watertight joints.
- C. Splices: Splice roof expansion joints to provide continuous, uninterrupted, and waterproof joints.
1. Install waterproof splices and prefabricated end dams to prevent leakage of secondary-seal membrane.
- D. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

END OF SECTION

06/06/18

SECTION 07 84 13

PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Requirements:

1. Section 07 84 43 "Joint Firestopping" for joints in or between fire-resistance-rated construction, and in smoke barriers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system

manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.6 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."
 - 2) Intertek Group in its "Directory of Listed Building Products."
 - 3) FM Global in its "Building Materials Approval Guide."

2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products; www.3m.com/firestop
 - b. Hilti, Inc.; www.hilti.com
 - c. The RectorSeal Corporation; www.rectorseal.com
 - d. Specified Technologies, Inc.; www.stifirestop.com
 - e. Tremco, Inc.; www.tremcosealants.com
 - f. U.S. Gypsum Company; www.usg.com
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
 3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.
1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
1. Permanent forming/damming/backing materials.
 2. Substrate primers.
 3. Collars.
 4. Steel sleeves.

2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-

retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.
- K. 3M Fire Barrier CP25WB+ Sealant: High-performance, intumescent, water-based sealant. No-sag, fast drying, paintable, red in color. Versatile firestop sealant for pipes (not for use with CPVC), cables, cable tray, blank opening and other penetrations along with mineral wool or other fire-rated assembly products.
 - 1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire-rated systems.
 - 2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.
 - 3. STC rating of 54 when tested in STC 54-rated wall assembly.
- L. 3M Fire Barrier Water Tight Sealant 3000 WT: Single-part, water-tight, intumescent silicone firestop sealant for filling voids in concrete gypsum, metal, plastic, wood and insulation. Light gray color with black flecks. Meets UL Water Leakage Test, W Rating – Class 1 requirements.
 - 1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire-rated systems.
 - 2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.
 - 3. STC rating of 53 when tested in STC 54-rated wall assembly.
- M. 3M Fire Barrier Moldable Putty+: One-part, 100 percent solids intumescent firestop. Remains pliable, flexible and easily re-enterable. Non-toxic synthetic formula. Versatile putty for pipes, cables, cable tray, blank opening and other penetrations along with mineral wool or other fire-rated assembly products.
 - 1. Type: Stick or Pad.
 - 2. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
 - 3. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

2.4 MIXING

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
 - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."

2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

3.7 PENETRATION FIRESTOPPING SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Where Intertek Group-listed systems are indicated, they refer to design numbers in Intertek Group's "Directory of Listed Building Products" under "Firestop Systems."
- C. Where FM Global-approved systems are indicated, they refer to design numbers listed in FM Global's "Building Materials Approval Guide" under "Wall and Floor Penetration Fire Stops."
- D. Penetration Firestopping Systems Schedule: TBD.

END OF SECTION

06/06/18

SECTION 07 84 43

JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.
2. Joints in smoke barriers.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Requirements:

1. Section 07 84 13 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

- B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.6 COORDINATION

- A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."
 - 2) Intertek Group in its "Directory of Listed Building Products."

2.2 FIRESTOPPING, GENERAL

- A. Provide fire-resistive joint system products that are compatible with one another, with the substrates forming openings, under conditions of service and application, as demonstrated by fire-resistive joint system product manufacturer based on testing and field experience.
- B. Provide components for each fire-resistive joint system that are needed to install fill materials. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

2.3 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.

- c. Nelson Firestop; a brand of Emerson Industrial Automation.
 - d. RectorSeal.
 - e. Roxul Inc.
 - f. Specified Technologies, Inc.
 - g. Thermafiber, Inc.; an Owens Corning company.
 - h. Tremco, Inc.
- 2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- C. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.
 - c. Nelson Firestop; a brand of Emerson Industrial Automation.
 - d. RectorSeal.
 - e. Roxul Inc.
 - f. Specified Technologies, Inc.
 - g. Thermafiber, Inc.; an Owens Corning company.
 - h. Tremco, Inc.
 - 2. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.
- D. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

2.4 MATERIALS

- A. General: Use only fire-resistive joint system products that have been tested for specific fire-resistance-rated construction conditions conforming to construction assembly type, linear void width, movement capabilities, and fire-rating involved for each separate instance.
- B. Elastomeric Sealants: Single component latex formulations that upon cure do not re-emulsify during exposure to moisture and accommodate minimum ± 25 percent movement, the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) SpecSeal Series AS Elastomeric Spray.
 - 2. Specified Technologies, Inc. (STI) SpecSeal Series ES Elastomeric Sealant.
- C. Silicone Sealants: Moisture curing, single component, silicone elastomeric sealant for horizontal surfaces (pourable or nonsag) or vertical surface (nonsag), the following products are acceptable:
 - 1. Specified Technologies, Inc. (STI) SpecSeal SIL300 Silicone Firestop Sealant
- D. Intumescent Sealants: Single component intumescent latex formulations containing no water soluble intumescent ingredients capable of expanding a minimum 8 times, the following products are acceptable:

1. Specified Technologies, Inc. (STI) SpecSeal Series LCI Intumescent Sealant

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing fire-resistive joint systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
 2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
 3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Designation of applicable testing agency.
 4. Date of installation.
 5. Manufacturer's name.
 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2393.
- B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

3.7 JOINT FIRESTOPPING SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHBN.
- B. Joint Firestopping System Schedule: TBD.

END OF SECTION

06/06/18

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Sealant work, except as otherwise specified, required to weatherproof the buildings, and including interior sealant work. This section contains requirements pertaining to all weather and interior sealant work throughout the project and becomes a part of each and every section calling for sealant and calking, unless otherwise specified, as though written in full in each section.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Sections:
 - 1. Section 07 84 43 "Joint Firestopping" for sealants for joint firestopping systems.
 - 2. Section 08 80 00 "Glazing" for sealants for glazing work.
 - 3. Section 09 29 00 "Gypsum Board" for sealing perimeter systems.

1.2 REFERENCES

- A. The editions of ASTM International Standards referenced herein apply to the work only to the extent specified by the reference thereto. Refer to Section 01 42 19 for information concerning availability and use of references.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint sealant product. Submit copies of manufacturer's specifications, recommendations and installation instructions for each type of sealant and related material required.
- B. Samples: Submit samples indicating the color range available for each sealant material intended for installation in locations exposed to view. Materials installed before approval of color will be subject to removal and replacement with approved material.
- C. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each kind of joint sealant, for tests performed by a qualified testing agency.
 - 1. Include manufacturer's letter of certification, or certified test reports indicating that each material complies with the requirements specified herein and is suitable for the applications indicated.
 - 2. Include manufacturer's letter of certification indicating that sealants, primers and cleaners comply with regulations controlling use of volatile organic compounds.

1.5 QUALITY ASSURANCE

- A. **Manufacturer's Qualifications:** Obtain joint sealants from a single manufacturer for each different product required. Obtain elastomeric sealants only from manufacturers who will, if required by the Architect, send a qualified technical representative to the Project site to advise the installer of proper procedures and precautions for the use of these materials.
- B. **Installer's Qualifications:** Employ a firm having a minimum of 5 years successful experience in the application of the types of materials required.
- C. **Regulatory Requirements.** The quantity of volatile organic compounds (VOC) used in sealants, primers and cleaners shall not exceed the limits permitted under the current regulations for architectural coatings of the Bay Area Air Quality Management District.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sealants to the Project site in unopened containers, labeled with the manufacturer's name, brand designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi component materials.
- B. Store sealants in an area where they will not be subject to temperatures above 100 degrees F or below 40 degrees F. Do not store materials that have exceeded the manufacturer's recommended shelf life.

1.7 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

- A. Provide an extended warranty under the provisions of Section 01 78 36.
- B. Warrant work under this section against moisture penetration for a period of 5 years from the date of "Substantial Completion". The written warranty shall include materials and labor required to repair leaks that develop. The warranty shall be signed by the sealant manufacturer, the sealant installer and the Contractor.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. **Compatibility:** Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SEALANT MATERIALS

- A. Type A Sealant: Multiple component, self-leveling polyurethane based sealant meeting the requirements of ASTM C920, Type M, Grade P, Class 25. Acceptable products or equal:

Pecora Corp.; Urexpam NR-200
Sika Corp.; Sikaflex-2c-SL
Sonneborn Building Products; Sonolastic SL 2
Tremco, Inc.; Vulkem 445 SSL

- B. Type B Sealant: Single or multiple component, nonsag polyurethane based sealant meeting the requirements of ASTM C920, Type S or M, Grade NS, Class 25. Do not use single component sealants when excessive movement is expected within the curing time of the sealant. Acceptable products or equal:

BASF MasterSeal NP 1 or NP 2
Pecora Corp.; Dynatrol I or II
Sika Corp.; Sikaflex 1a or 2c-NS Ez-Mix
Tremco; Dymonic FC or Dymeric 240 FC

- C. Type C Sealant: Butyl rubber based sealant meeting the requirements of ASTM C920, Type S, Grade NS, Class 7.5. Acceptable products or equal:

Adco Seal; No. B-100
Pecora Corp.; BC-158
PTI Sealants; PTI 757
Tremco; Butyl Sealant

- D. Type D Sealant: Latex acrylic based sealant meeting the requirements of ASTM C834. Acceptable products or equal:

Pecora Corp.; AC-20
Sonneborn Building Products; Sonolac
Tremco; Acrylic Latex 834

- E. Type E Sealant: Medium modulus silicone sealant meeting the requirements of ASTM C920, Type S, Grade NS, Class 50. Acceptable products or equal:

Dow Corning Corp.; No. 795
Momentive; Silpruf SCS 2000
Sika Corp.; SikaSil 295
Tremco, Inc.; Spectrem 2

- F. Type F Sealant: Narrow joint seam sealant meeting the requirements of AAMA 803.3-1976 and formulated for sealing joints 3/16-inch or smaller in width. Acceptable product or equal:

PTI Sealants; PTI 200

- G. Type G Sealant: Multiple component, nonsag polysulfide or polyurethane based sealant meeting the requirements of ASTM C920, Type M, Grade NS, Class 25, Use I, recommended by the manufacturer for continuously submerged joints. Acceptable products or equal:

L.M. Scofield Co.; Lithoseal Watercalk-3G
Sika Corp.; Sikaflex 2c NS Ez-Mix
Tremco, Inc. Dymeric 240 FC

H. Acoustical Sealant: Sealant shall be one of the following types at the Contractor's option:

1. Polyvinyl chloride foam tape with pressure sensitive tape on one side 3/4-inch wide by the thickness required to accommodate unevenness of substrates and completely fill openings between partition framing and building floors and concrete or masonry wall. Acceptable products or equal:

Norton Co.; Norseal V730 Series
Arlon; Series 6A

2. Permanently resilient compound manufactured specifically for acoustical applications. Acceptable products or equal:

Ohio Sealants; Sound Calk (solvent type)
Pecora Corp.; BA-98
Tremco; Acoustical Sealant

2.3 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin, or Type O (open-cell material), as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
 1. Profile: Round in shape, with diameter never less than 30 percent greater than width of joint.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the joint surfaces, backing, and anchorages of units forming sealant rabbet, and the conditions under which the sealant work is to be performed for conditions that would adversely affect the performance of the sealant.
- B. Do not proceed with the sealant work until unsatisfactory conditions have been corrected. Start of sealant work constitutes acceptance of conditions.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Portland-Cement Plaster
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 JOINT DIMENSIONS

- A. Butyl Base Type Sealant: Minimum joint width of 1/4-inch, and the depth of 3 times the width of the joint, with the maximum depth 3/4-inch.
- B. Silicone Rubber Sealant: Minimum joint width of 1/4-inch, and depth of approximately one-half the width, but in no case less than 1/4-inch. Other width-to-depth ratios as follows:

JOINT WIDTH:

JOINT DEPTH:

For Nonporous Surfaces:

Minimum

Maximum

1/4" (minimum)	1/4"	1/4"
1/4" to 1/2"	1/2 of width	Equal to width
Over 1/2"	Not Permitted	

For Porous Surfaces

1/4" (minimum)	1/4"	1/4"
1/4" to 1/2"	1/4"	Equal to width
1/2" to 1"	1/2"	Equal to width
Over 1"	Not Permitted	

- C. Acrylic and Polyurethane: Minimum joint width of 1/4-inch, and depth equal to width, but in no case deeper than 1/2-inch. Other width-to-depth ratios as follows:

JOINT WIDTH:

JOINT DEPTH:

For Nonporous Surfaces:

Minimum

Maximum

1/4" (minimum)	1/4"	1/4"
1/4" to 1/2"	Equal to width	Equal to width
Over 1/2" to 1" maximum	1/2"	1/2"

For Porous Surfaces

1/4" (minimum)	1/4"	1/4"
1/4" to 1/2"	1/4"	Equal to width
1/2" to 1"	1/2"	1/2"
Over 1"	Not Permitted	

3.4 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide flush joint profile unless otherwise indicated, according to Figure 8B in ASTM C 1193. Rounded off finishing will not be allowed.
- G. Seal around all openings in exterior walls, and other locations indicated or required for waterproofing the buildings. Seal all other joints as herein specified, indicated, and required to properly complete the buildings.
- H. Apply sealants using specified materials and proper tools. Prepare surfaces (cleaning, etc.) and apply sealant as specified herein and in accordance with the manufacturer's printed instruction and recommendations.
- I. Do not use sealants when they become too jelled to be discharged in a continuous flow from the gun. Modification of sealants by addition of liquids, solvents, or powders will not be permitted.
- J. Apply sealants with guns having proper size nozzles. Use sufficient pressure to fill all voids and joints solid. In sealing around openings, include entire perimeter of each opening, unless indicated or specified otherwise. Where the use of the gun is impracticable, use suitable hand tools.
- K. Neatly point sealed joints on flush surfaces with beading tool, and internal corners with eaving tool. Remove excess material. Sealant, where exposed, shall be free of wrinkles and uniformly smooth. Complete sealing before final coats of paint are applied.

3.5 MISCELLANEOUS JOINT SEALING WORK

- A. The entire extent of sealing work is not necessarily fully or individually described herein. Provide sealing wherever required to prevent light leakage as well as moisture leakage. Refer to drawings for conditions and related parts of the work.

3.6 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.7 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.8 SEALANT APPLICATION SCHEDULE

- A. Type A Sealant: Use for all joints in exterior and interior concrete and ceramic and quarry tile floors and paved surfaces subject to foot traffic.
- B. Type B Sealant: Use for all vertical joints in masonry, plaster, and concrete, exposed on the exterior of the building and for sealing around metal door, window and louver frames penetrating these surfaces.
- C. Type C Sealant: Use for interior wall penetrations for pipe or conduit that will be concealed by escutcheons or other trim or plates and for lap joints in sheet metal work.
- D. Type D Sealant: Use for joints, voids, and penetrations in interior surfaces exposed to view and requiring painting.
- E. Type E Sealant: Use for all joints in contact with organically coated aluminum and for joints between precast and tilt-up concrete panels.
- F. Type F Sealant: Use for all narrow joints in aluminum storefront and curtain wall framing where joints are mechanically restricted from movement.
- G. Type G Sealant: Use for joints between window frames and other materials, and at other exterior joints for which no other sealant is indicated.
- H. Acoustical Sealant: Use to seal all perimeter joints around sound retardant partitions and around electrical boxes and other penetrations in these partitions.

END OF SECTION

06/06/18

SECTION 08 12 13

HOLLOW METAL FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Interior standard steel frames.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Sections:
 - 1. Section 08 14 16 "Flush Wood Doors".
 - 2. Section 09 91 00 "Painting" for field applied finish.

1.2 REFERENCES

- A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the references. Refer to Section 01 42 19 for information concerning availability and use of references.

American National Standards Institute (ANSI)
ASTM International (ASTM)
National Fire Protection Association (NFPA)
National Association of Architectural Metal Manufacturers (NAAMM)
Steel Door Institute (SDI)

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal cutouts and reinforcement for door hardware, electric devices and recessed items.
- C. Coordinate work with frame opening construction, door and hardware installation.
- D. Sequence installation to accommodate required door hardware.
- E. Verify field dimensions for factory assembled frames prior to fabrication.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each frame type.
 - 2. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 3. Locations of reinforcement and preparations for hardware.
 - 4. Details of each different wall opening condition.
 - 5. Details of anchorages, joints, field splices, and connections.
 - 6. Details of accessories.
 - 7. Details of moldings, removable stops, and glazing.
- C. Templates: Secure templates from finish hardware supplier for specified hardware and mounting locations.
- D. Product Schedule: For hollow-metal frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.
- E. Submittal procedures and quantities are specified in Section 01 33 00.

1.6 QUALITY ASSURANCE

- A. Provide frames meeting the requirements of either SDI A250.8 or NAAMM HMMA 861 for standard sizes and designs.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal frames vertically under cover at Project site with head up. Place on minimum 4-inch high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Mark or tag each frame with the appropriate opening identification symbol.

1.8 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace hollow metal frames that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Acceptable manufacturers or equal:

Amweld Building Products, Inc.; www.blackmountaindoor.com
Ceco Corp.; www.cecodoor.com
Curries Company; www.curries.com; an Assa Abloy Group company.
Door Components; www.doorcomponents.com
Forderer Cornice Works; www.fordererdoors.com
Republic Builders Products Corporation; www.republicdoor.com
Steelcraft Manufacturing Co.; www.steelcraft.com
Titan Metal Products; www.titanmetalinc.com
Substitutions: Section 01 25 13 – Product Options and Substitutions.

2.2 INTERIOR STANDARD STEEL FRAMES

A. Construct hollow-metal frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra Heavy-Duty Frames: SDI A250.8, Level 3.

1. Physical Performance: Level A according to SDI A250.4.
2. Frames:
 - a. Materials: ASTM A1008, uncoated, steel sheet, minimum thickness of 16 gauge (0.053 inch).
 - b. Construction: Full profile welded, grind welds smooth.
3. Exposed Finish: Prime.

2.3 FRAME ANCHORS

A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard, suitable for performance level indicated.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Where indicated, provide floor anchors for each jamb and mullion that extends to floor. Form floor anchors from same material as frames, minimum thickness of 0.042 inch, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

C. Material: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

2.4 MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- C. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

2.5 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 2. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
 - 3. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Stud-Wall Type: Locate anchors not more than 18 inches from top and 9 inches from bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - b. Compression Type: Not less than two anchors in each frame.
 - c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 - 4. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.

5. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

- a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
- b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

C. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.

D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

- 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
- 2. Comply with applicable requirements in SDI A250.6, SDI A250.8, and BHMA A156.115 for preparation of hollow-metal work for hardware, except provide 8-gage minimum hinge reinforcement for exterior doors.

2.6 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

- 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

B. Field Finish: Field finish painting is specified in Section 09 91 00.

2.7 CLEARANCES

A. Provide doors and frames with clearances in accordance with SDI A250.8 or NAAMM HMMA 861.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

- B. Drill and tap frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow-metal frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Hollow-Metal Frames: Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - b. Install frames with removable stops located on secure side of opening.
 - c. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - d. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 - 3. Solidly pack mineral-fiber insulation inside frames.
 - 4. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

END OF SECTION

06/06/18

SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid-core doors with MDO faces.
2. Shop priming flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Sections:

1. Section 08 12 13 "Hollow Metal Frames".
2. Section 08 71 00 "Door Hardware".

1.2 REFERENCES

A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the references. Refer to Section 01 42 19 for information concerning availability and use of references.

American National Standards Institute (ANSI)
ASTM International (ASTM)
Window and Door Manufacturers Association (WDMA)
National Fire Protection Association (NFPA)
Woodwork Institute (WI)

1.3 ACTION SUBMITTALS

A. Product Data: For each type of door. Submit catalog cuts or other data indicating thickness, details of stile, rail and core construction of doors, lite frames, louvers, type of adhesive, face veneer material and grade, and specifications for factory finishing.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.
5. Doors to be factory finished and finish requirements.
6. Fire-protection ratings for fire-rated doors.

C. Samples for Initial Selection: For factory-primed doors. Submit factory finishes applied to actual door face materials, approximately 8" by 10".

D. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.
- B. Quality Standard Compliance Certificate: WI Certified Compliance Program certificates.

1.5 QUALITY ASSURANCE

- A. Certification: Before delivery to the project site, issue a WI Certified Compliance Certificate indicating that the wood doors furnished fully meet requirements of the grade specified.
 - 1. After completion issue a WI Certified Compliance Certificate for Installation.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Delivery: Seal all four edges of doors before shipment. Package factory finished doors individually in plastic bags or cardboard cartons. Deliver doors to the site after plaster and concrete are dry and the building has reached the average prevailing relative humidity of the locality.
- C. Mark each door on top rail with opening number used on Shop Drawings. Include manufacturer's order number and date of manufacture.
- D. Storage and Handling: Store doors in an area where there will be no great variation in temperature or humidity. Stack doors flat on 2" by 4" lumber laid 12-inches from ends and across the center. To protect surfaces, provide plywood or cardboard under the bottom door and over the top of the stack. Do not drag doors across one another.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period.

1.8 WARRANTY

- A. Provide an extended warranty under the provisions of Section 01 78 36.
- B. Furnish to the Owner a written warranty against defects in workmanship and materials including delamination in any degree, warp or twist of 1/4-inch or more in any 3'-6" by 7'-0" section of a door, telegraphing of any part of core assembly through face veneer to cause surface variation of 1/100-inch or more in a 3-inch span, defects which impair and affect performance of the door. Replacement under this warranty shall include hanging, installation of hardware and finishing. The warranty shall be signed by the door manufacturer and the Contractor.
- C. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Acceptable manufacturers or equal:

Algoma Hardwoods, Inc.; www.algomahardwoods.com
Eggers Industries; www.eggersindustries.com
Oregon Door; www.oregondoors.com
Oshkosh Architectural Door Company; www.oshkoshdoor.com
Marshfield DoorSystems; www.marshfelddoors.com
VT Industries, Inc.; www.vtindustries.com
Substitutions: Section 01 25 13 – Product Options and Substitutions.

B. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."

1. Provide WI Certified Compliance Labels indicating that doors comply with requirements of grades specified.

B. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
2. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
3. Pairs: Provide formed-steel edges and astragals with intumescent seals.
 - a. Finish steel edges and astragals to match door hardware (locksets or exit devices).

D. Particleboard-Core Doors:

1. Particleboard: ANSI A208.1, Grade LD-2 as required to meet WDMA Performance Duty level specified without added blocking.

E. Structural-Composite-Lumber-Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.
 - a. Screw Withdrawal, Face: 700 lbf.
 - b. Screw Withdrawal, Edge: 400 lbf.

F. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.

2.3 DOORS FOR OPAQUE FINISH

A. Interior Solid-Core Doors:

1. Grade: Custom.
2. Faces: MDO.
 - a. Apply MDO directly to high-density hardboard crossbands.
3. Exposed Vertical Edges: Any closed-grain hardwood.
4. Core: Wood-based particleboard, which complies with ANSI A208.1.
5. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.

B. Door Thickness: 1-3/4 inches thick unless otherwise indicated.

2.4 LITE FRAMES AND LOUVERS

A. Metal Frames for Lite Openings: Provide glazed openings with not lighter than 0.0359-inch (20-gage) hot or cold rolled steel glazing stops. Stops shall be nonremovable on exterior or corridor side of door, custom color as selected by the Architect. Glass and glazing materials and methods are specified in Section 08 80 00. Acceptable products, or equal:

Anemostat Door Products; www.anemostat.com; LoPro-G

B. Louvers: Provide fixed louvers consisting of louver blades formed of not lighter than 22 gage cold rolled steel, with welded 18 gage steel frames, custom color as selected by the Architect. Acceptable product, or equal:

Anemostat Door Products; www.anemostat.com; AFDL Inverted Y Non-Vision Louver

1. Aesthetics: Tight mitered corners, no visible welds, countersunk mounting holes and corridor side of frame free of fasteners make for a clean, streamlined appearance.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

C. Openings: Factory cut and trim openings through doors.

1. Lite Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08 80 00 "Glazing."
3. Louvers: Factory install louvers in prepared openings.

2.6 SHOP PRIMING

- A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in Section 09 91 00 "Painting."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with installer present, before hanging doors.
 - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Section 08 71 00 "Door Hardware".
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
 - 1. Install fire-rated doors according to NFPA 80.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
 - b. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
 - 2. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

- A. Operation: Correct any deficiency that prohibits the door from swinging or operating freely. Do not remove hinge screws after initial insertion. Shims used for alignment purposes must be inserted between hinge and frame. Do not insert shims between hinge and door.

- B. To prevent stile failure, ensure that door closers are properly adjusted and do not limit the door opening swing. Limit door opening swing only with a properly located stop.
- C. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

06/06/18

SECTION 08 31 13

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes access doors and frames for walls and ceilings.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Sections:
 - 1. Section 09 91 00 "Painting" for field painting of steel wall and ceiling access panels.
 - 2. Section 23 33 00 "Duct and Accessories" for heating and air-conditioning duct access doors.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, fire ratings, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Detail fabrication and installation of access doors and frames for each type of substrate.
- C. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.
- D. Submittal procedures and quantities are specified in Section 01 33 00.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Provide packaging such as cardboard or other containers to protect access panels during delivery and storage.
- B. Store access panels elevated off the floor in a dry weather tight enclosure. Provide adequate ventilation to avoid condensation. If the container becomes wet remove the panel from the container immediately.

1.4 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace access doors and frames that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, according to NFPA 252 or UL 10B.

2.2 ACCESS DOORS AND FRAMES

- A. Manufacturers:

Cesco Products; www.cescoproducts.com
Larsen's Manufacturing Company; www.larsensmfg.com
Milcor, Inc.; www.milcorinc.com
Nystrom, Inc.; www.nystrom.com

- B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

2.3 FIRE RESISTANT WALL AND CEILING ACCESS PANELS

- A. Fire Rated Wall and Ceiling Access Panels: Acceptable products or equal:

Cesco Products; Style FB
Larsen's Manufacturing Company; L-FRAP
Milcor, Inc.; 3208 Series
Nystrom, Inc.; FR Series

1. Frame and Panel Assembly: Bear the UL label for 1-1/2 hour B label, 250 degrees maximum 30 minute temperature rise.
2. Frames: 16-gage steel.
3. Panels: 20-gage steel sandwich type equipped with an automatic closing mechanism.
4. Lock Assembly: Self-latching type with key operated cylinder lock and a mechanism to release the latch bolt from the inside. Furnish 2 keys per lock and key all locks alike.
5. Hinges: Continuous type, steel with stainless steel pins.
6. Finish: Factory applied baked enamel prime coat over a protective phosphate coating; final field finish specified in Section 09 91 00.

2.4 NON-RATED WALL AND CEILING ACCESS DOORS AND FRAMES

- A. Flush Access Doors with Concealed Flanges Mounted in Gypsum Board: Acceptable products or equal:

Cesco Products; HF Series
Larsen's Manufacturing Company; L-DWC
Milcor, Inc.; Style DW
Nystrom, Inc.; NW Series

1. Frame Material: 16-gage steel with 26-gage galvanized steel casing bead surrounding the frame or 0.060-inch extruded aluminum.
 2. Door Material: 14-gage steel.
 3. Hinges: Concealed spring hinges or concealed piano hinges, opening to 175 degrees.
 4. Locks: Flush, key operated cylinder lock. Furnish 2 keys per lock and key all locks alike.
 5. Finish: Factory applied baked enamel prime coat over a protective phosphate coating on steel; final field finish specified in Section 09 91 00.
- B. Exterior Panels at Shut-Off Valves: Acceptable product or equal:
- Babcock-Davis; B-HS Series
1. Frames: 2" by 2" by 3/16" steel angle with 1" by 1" by 1/8" door stop.
 2. Panel: 10-gage steel plate.
 3. Hinges: 4" by 4" butt hinges welded to door and frame.
 4. Locks: Screwdriver operated cam locks.
 5. Finish: Factory applied powder coated finish color as selected by the Architect to match adjacent surfaces.

2.5 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- D. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304. Remove tool and die marks and stretch lines, or blend into finish.
- E. Frame Anchors: Same material as door face.
- F. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.6 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. For concealed flanges with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
 - 2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded metal lath and exposed casing bead welded to perimeter of frames.
 - 3. Provide mounting holes in frames for attachment of units to metal or wood framing.

2.7 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. 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.
- D. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
- E. Stainless-Steel Finishes:
 - 1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - 2. Polished Finish: No. 4 finish. Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.

- B. Provide access doors and frames where indicated or where required to provide access to valves, flow indicators, dampers and air splitters concealed within walls or chases or above ceilings.
- C. Set frames accurately in position and attach securely to supports with plane of door face panels aligned with adjacent finished surfaces.
- D. Install concealed-frame access panels flush with adjacent finish surfaces.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION

06/06/18

SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Storefront framing, fixed window framing, and operable project-out vents.
2. Manual-swing entrance doors and door-frame units.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Sections:

1. Section 05 40 00 "Cold-formed Metal Framing."
2. Section 07 92 00 "Joint Sealants."
3. Section 08 71 00 "Door Hardware."
4. Section 08 80 00 "Glazing".
5. Section 09 22 16 "Non-Structural Metal Framing."

1.2 REFERENCES

A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

Aluminum Association (AA)
ASTM International (ASTM)
Architectural Aluminum Manufacturers Association (AAMA)
The Society for Protective Coatings (SSPC)

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.

- e. Flashing and drainage.
- 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- B. Structural Calculations: Along with the shop drawings, submit structural calculations prepared, signed and sealed by a structural engineer registered in California. Calculations shall show that storefront framing and anchorage will withstand the wind, dead, seismic, and other loads specified herein. Design members in accordance with 2016 CBC Chapters 20 and 22A with allowable stresses not to exceed yield stresses stated therein. Show section property computations for all framing members.
- C. Fabrication Sample: Of typical vertical-to-horizontal intersection of aluminum-framed systems, made from 12" lengths of full-size components and showing details of the following:
 - 1. Joinery, including concealed welds.
 - 2. Anchorage.
 - 3. Expansion provisions.
 - 4. Glazing.
 - 5. Flashing and drainage.
- D. Installation Instructions: Provide complete diagrams, templates, and installation instructions as required for the installation of the storefront system, in sufficient time so that backing, framing, and formwork can be properly installed, and so that the work of other trades will not be delayed.
- E. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
- F. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.
 - 1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.
- C. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by a qualified testing agency.
- D. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.
- B. Manufacturer Qualifications: A manufacturer capable of providing aluminum framed storefront system that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.
- C. Source Limitations: Obtain aluminum framed storefront system through one source from a single manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum framed storefront system and are based on the specific system indicated. Do not modify size and dimensional requirements.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup for type(s) of storefront elevation(s) as directed by Architect.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
 - 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 - 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
- F. Accessible Entrances: Comply with Accessibility requirements.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver aluminum entrance and storefront components in the manufacturer's original protective packaging with identification labels intact.
- B. Store entrance and storefront sections out of contact with the ground and under a weather tight covering. Do not cover storefront and entrance sections with polyethylene film or similar coverings that will create a humidity chamber. If factory coated aluminum is protected with a strippable plastic film, remove the film before exposing the materials to direct sunlight.
- C. Protect factory-coated surfaces during shipping and handling to prevent scratching, gouging or other damage to the finish.

1.9 FIELD MEASUREMENTS

- A. Secure accurate field measurements required for the manufacture and installation of aluminum entrance and storefront work. Consult with the various trades whose work adjoins this work and be responsible for all measurements and the working out of all details.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating aluminum-framed systems without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.10 WARRANTY

- A. Provide an extended warranty under the provisions of Section 01 78 36.
- B. Special Assembly Warranty: Manufacturer standard form in which manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components to function properly.
 - 2. Warranty Period: Two years from date of Substantial Completion.
- C. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Deterioration includes, but is not limited to, the following:
 - 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS - STOREFRONT

- A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.

- c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
- B. Structural Loads:
- 1. Wind Loads: As indicated on Structural Drawings.
 - 2. Other Design Loads: As indicated on Structural Drawings.
- C. Deflection of Framing Members:
- 1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
- D. Structural-Test Performance: ASTM E 330 as follows:
- 1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
 - 2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 - 3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.
- E. Story Drift: Provide aluminum-framed systems that accommodate design displacement of adjacent stories indicated.
- 1. Design Displacement: As indicated on Drawings.
- F. Test Performance: Meet criteria for passing, based on building occupancy type, when tested according to AAMA 501.4 at design displacement.
- G. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 CFM psf at a static air pressure differential of 6.24 psf.
- H. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 8 psf as defined in AAMA 501.
- I. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor of not less than 62 frame (Glass to Center) and 68 glass (low-e) when tested according to AAMA 1503.
- J. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than:
- 1. Glass to Center: 0.44 (low-e). (Based upon 1" clear insulating glass (1/4" clear with e = 0.035 Low E Coating on #2 Surface, 1/2" air space with warm edge spacer and 90% argon gas fill, 1/4" clear.)
- K. Thermal Transmittance (U-factor): Provide aluminum-framed systems with fixed glazing and framing areas having U-factor of 0.44 Btu / sq. ft. x h x deg F or better when tested according to AAMA 1503, based on 1" clear insulating glass (1/4" clear glass with low e coating on #2 surface + 1/2" Air Space with 90% argon gas fill + 1/4" clear glass).

2.2 PERFORMANCE REQUIREMENTS – ENTRANCE DOORS

- A. Wind loads: Provide aluminum-framed entrance system; include anchorage, capable of withstanding wind load design pressures as indicated on Structural Drawings.
- B. Air Infiltration: For single acting offset pivot or butt hung entrances in the closed and locked position, the test specimen shall be tested in accordance with ASTM E 283 at a pressure differential of 1.57 psf for single doors and pairs of doors. A single 3'-0" x 7'-0" entrance door and frame shall not exceed 1.0 cfm/ft². A pair of 6'-0" x 7'-0" entrance doors and frame shall not exceed 1.0 cfm/ft².
- C. Structural Performance: Corner strength shall be tested per the Kawneer dual moment load test procedure and certified by an independent testing laboratory to ensure weld compliance and corner integrity. Testing procedure and certified test results available upon request.

2.3 PERFORMANCE REQUIREMENTS – PROJECT OUT VENTS

- A. General Performance: Aluminum-framed window system shall withstand the effects of the following performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Window Performance Requirements:
 - 1. Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS).
 - a. Performance Class and Grade: (P-HC40 – P-HC70) Project-Out Window
 - 2. Air Infiltration: The test specimen shall be tested in accordance with ASTM E283 at a minimum size of 60" x 36" Project-Out. Air infiltration rate shall not exceed 0.10 cfm/ft² at a static air pressure differential of 6.24 psf.
 - 3. Water Resistance: The test specimen shall be tested in accordance with ASTM E547 and ASTM E331 at a minimum size of 60" x 36" Project-Out. There shall be no leakage as defined in the test method at a static air pressure differential of 15 psf.
 - 4. Uniform Load Deflection: A minimum static air pressure difference of (40 psf (2 Locks)) or (70 psf (3 Locks)) shall be applied in the positive and negative direction in accordance with ASTM E330. There shall be no deflection in excess of L/175 of the span of any framing member.
 - 5. Uniform Load Structural: A minimum static air pressure difference of (60 psf (2 Locks)) or (105 psf (3 Locks)) shall be applied in the positive and negative direction in accordance with ASTM E330. The unit shall be evaluated after each load with permanent set not to exceed 0.2% of span length.
 - 6. Component Testing: Window components shall be tested in accordance with procedures described in AAMA/WDMA/CSA 101/I.S.2/A440 and AAMA 910.

NOTE; THERMAL TRANSMITTANCE AND CONDENSATION RESISTANCE TEST RESULTS NOTED ARE BASED UPON 1" CLEAR INSULATING GLASS. (1/8" + 3/4" AS +1/8")

- 7. Thermal Transmittance (U-Factor): When tested to AAMA Specification 1503, the thermal transmittance (U-Factor) shall not be more than;
 - a. Project-Out Windows: 0.68 BTU/hr/ft²/°F. (NFRC – 0.62).
- 8. Condensation Resistance Test (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, the condensation resistance factor (CFR) shall not be less than; Frame 51, Glass 54.

9. Thermal Transmittance Test: (U-Factor): The conductive thermal transmittance (U-Factor) shall not be more than (____) BTU/hr/sf/°F per AAMA 507 or NFRC 100 when using project specified glass.
10. Temperature Index (I): Provide aluminum windows tested for thermal performance according to CSA-A440 with a Temperature Index (I) not less than: 47.7.
11. Forced Entry Resistance: All windows shall conform to ASTM F588, Grade 10.
12. Windborne-Debris-Impact-Resistance Performance: Shall be tested in accordance with ASTM E 1886 and information in ASTM E 1996 and TAS 201/203.
 - a. Large - Missile Impact: For aluminum-framed systems located within 30 feet of grade.
 - b. Small - Missile Impact: For aluminum-framed systems located within 30 feet above grade.

2.4 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Kawneer Company Inc.; www.kawneer.com; Series: Tri-Fab VG 451T.

Arcadia, Inc.; www.arcadiainc.com; Series: AG451T.

U.S. Aluminum Corp.; www.usalum.com; Series: 451.

Old Castle Building Envelope; www.oldcastlebe.com; Series: 3000 Thermal MultiPlane.

Substitutions: Section 01 25 13 – Product Options and Substitutions.

- B. Basis-of-Design Product:

1. Kawneer Company Inc.
2. Series: Trifab™ VG 451T (Thermal) Storefront System.
3. System Dimensions: Nominal 2" x 4-1/2".
4. Glass: Center.
5. Framing Fabrication: (TBD: Screw Spline; Shear Block; or Stick Fabrication).
6. Windload Chart Performance: Based on composite properties of Kawneer profiles 451T-CG-540 and 451T-CG-010, which are calculated in accordance with AAMA TIR-A8 and AAMA 505.

2.5 MATERIALS

- A. Aluminum:

1. Extruded Aluminum: 6063-T6 alloy or other alloy standard with the manufacturer having equivalent structural and corrosion resistance properties and as recommended by the manufacturer for required finish meeting the requirements of ASTM B221; not less than 0.070-inch wall thickness at any location for the main frame.
2. Sheet Aluminum: 5055 aluminum alloy meeting the requirements of ASTM B209.
3. Provide exposed materials free from defects and other surface blemishes.

- B. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

- C. Fasteners: Provide nuts, screws, washers, bolts, clips, miscellaneous fastening devices, and internal components of aluminum, nonmagnetic stainless steel, or other non-corrosive materials compatible with the aluminum.

- D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.
- E. Glass and Glazing Materials: Comply with the requirements of Section 08 80 00.
 - 1. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.
 - 2. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
 - 3. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
- F. Concealed Flashing: 0.0179-inch (26-gage) minimum dead-soft stainless steel, or 0.040-inch minimum aluminum sheet of alloy and type selected by manufacturer for compatibility with other components.
- G. Weatherstripping:
 - 1. Compression Weatherstripping: Manufacturer's standard replaceable compressible weatherstripping gaskets of molded neoprene (ASTM D2000) or molded PVC (ASTM D2287).
 - 2. Sliding Weatherstripping: Manufacturer's standard replaceable wool, polypropylene, or nylon woven pile complying with AAMA 701.2.
- H. Bituminous Coatings: Cold applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil thickness per coat.
- I. Glass: Center. Provide horizontal and vertical members with a nominal face dimension of 2 inches and overall depth of 4-1/2 inches. The major portions of each extrusion shall be not less than 0.093-inch thick unless otherwise indicated or specified. Glass stops shall be not less than 0.050-inch thick.
- J. Glazing: Provide glass framing members designed for flush glazing on all sides with through sight lines and no projecting stops or face joints. Provide fully resilient setting of glass by use of vinyl, neoprene, or EPDM gaskets on both sides of the glass. Secure snap-in type stops at exterior side of aluminum framing to prevent removal.
- K. Steel Reinforcing: Provide vertical and horizontal steel reinforcing sized as required for members and based on structural calculations and design analyses for imposed dead loads and wind load.
- L. Door Stops: Door frames for doors hung on hinges or offset pivots shall have snap-in type door stops with pile weatherstripping at head and jams.
- M. Sealant: As specified in Section 07 92 00. For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.
- N. Tolerances: References to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

2.6 STOREFRONT FRAMING SYSTEM

- A. Thermal Barrier (Trifab® VG 451T):

1. Kawneer IsoLock® Thermal Break with 1/4" separation consisting of a two-part chemically curing, high-density polyurethane, which is mechanically and adhesively joined to aluminum storefront sections.
 - a. Thermal Break shall be designed in accordance with AAMA TIR-A8 and testing in accordance with AAMA 505.
 - B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
 - C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed, shall be stainless steel.
 - D. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
- 2.7 ENTRANCE DOOR SYSTEMS
- A. Manufacturers: Acceptable products or equal:
 1. Basis-of-Design Product: Kawneer Co., Inc.; TuffLine™ Series 500
Arcadia Inc.
U.S. Aluminum Corp.
Oldcastle Building Envelope™
 - B. Design: Manufacturer's standard heavy-duty wide stile doors where scheduled, except provide width dimensions for rails and stiles as noted. The major portions of each extrusion shall be not less than 0.188-inch thick unless otherwise indicated or specified. Glass stops shall be not less than 0.050-inch thick.
 1. Bottom Rail: 10".
 2. Top Rail: 6".
 3. Middle Rail: 6".
 4. Vertical Stiles: 6".
 5. Depth: 1-3/4".
 - C. Construction: Corner construction shall consist of both heavy reinforcement blocks or brackets secured with bolts or screws and SIGMA deep penetration welds. Furnish each door leaf with an adjustable mechanism allowing for minor field adjustments both vertically and front to back.
 - D. Glazing Stops: Provide snap-in type interior stops and lock in tamper proof type exterior stops with no exposed screws required to secure stops. Provide stops with vinyl, neoprene or EPDM bulb type glazing gaskets.
 - E. Weatherstripping: Provide pile weatherstripping on both stiles of center pivoted doors and on meeting stiles of offset pivoted doors.

2.8 ENTRANCE DOOR HARDWARE

- A. Finish hardware is specified in Section 08 71 00. Coordinate with hardware supplier to obtain factory installed hardware and templates for field-installed hardware. Provide stainless or galvanized steel reinforcing for hardware items to be secured to aluminum framing in the field.

2.9 PROJECT-OUT WINDOWS

A. Basis-of-Design Product: Kawneer GLASSvent™ Windows.

1. 2-13/16" system depth (with 1" infill glazing).
2. Performance Grade: P-HC40 with 1" Glass and 2 Cam Locks.

B. Materials:

1. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.090" wall thickness at any location for the main frame and sash members.
2. Thermal Barrier: The thermal barrier shall be Kawneer consisting of low conductive polymer full depth of infill.
3. Fasteners: Nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.
4. Anchors: Nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
5. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

C. Hardware:

1. Stainless Steel 4-Bar Hinges.
2. Cast White Bronze Cam Locking Handles.
3. Cast White Bronze Cam Handle with Pole Ring (where designated).

D. Fabrication:

1. Window Vent and/or Vent Frame Joinery: Mitered and Mechanically clipped and/or staked. Factory sealed vent and /or vent frame and corner joints.
2. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

2.10 FABRICATION

A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fit joints; make joints flush, hairline and weatherproof.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

B. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

- C. Storefront Framing: Fabricate components for assembly using manufacturer's standard installation instructions.
- D. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.11 ALUMINUM FINISH

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Factory Finishing:
 - 1. Kawneer Permanodic™ AA-M10C21A41 / AA-M45C22A41, AAMA 611, Architectural Class I Clear Anodic Coating (Color #14 Clear).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and supports for compliance with installation tolerances and other conditions that affect installation of aluminum entrances and storefronts. Correct unsatisfactory conditions before proceeding with the installation.
 - 1. Concrete and Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
 - 2. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure non-movement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 - 6. Seal perimeter and other joints watertight unless otherwise indicated.
- B. Metal Protection:
 - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
 - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed as specified in Section 07 92 00 "Joint Sealants" to produce weathertight installation.
- D. Install components plumb and true in alignment with established lines and grades.

- E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
- F. Install glazing as specified in Section 08 80 00 "Glazing."
- G. Install weatherseal sealant according to Section 07 92 00 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.
- H. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
 - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
 - 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible

3.3 ERECTION TOLERANCES

- A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
 - 1. Plumb: 1/8 inch in 10 feet.
 - 2. Level: 1/8 inch in 20 feet.
 - 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
 - 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field Tests: Architect shall select storefront units to be tested as soon as a representative portion of the project has been installed, glazed, perimeter caulked and cured. Conduct tests for air infiltration and water penetration with manufacturer's representative present. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount.
 - 1. Testing: Testing shall be performed by a qualified independent testing agency. Testing Standard per AAMA 503, including reference to ASTM E 783 for Air Infiltration Test and ASTM E 1105 Water Infiltration Test.
 - a. Air Infiltration Tests: Conduct tests in accordance with ASTM E 783. Allowable air infiltration shall not exceed 1.5 times the amount indicated in the performance requirements or 0.09 cfm/ft², whichever is greater.
 - b. Water Infiltration Tests: Conduct tests in accordance with ASTM E 1105. No uncontrolled water leakage is permitted when tested at a static test pressure of two-thirds the specified water penetration pressure but not less than 6.24 psf.

- C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- D. Manufacturer's Field Services: Upon Architect's or Owner's written request, provide periodic site visit by manufacturer's field service representative.

3.5 CLEANING

- A. Clean aluminum work before acceptance, removing blemishes, finger marks, oxidation, and leave in first-class condition. Use cleaning compounds approved by the aluminum framing manufacturer.
- B. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

3.6 ADJUSTING

- A. Entrances: Adjust operating hardware for smooth operation according to hardware manufacturers' written instructions.
 - 1. For doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch measured to the leading door edge.

3.7 PROTECTION

- A. After installation, protect exposed portions of the aluminum entrance work from damage by grinding and polishing compounds, plaster, lime, acids, cement or other contaminants.

END OF SECTION

06/06/18

SOUND CONTROL WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Sound Retardant Metal Fixed Window Systems where shown on drawings and specified herein.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Sections:
 - 1. Section 08 80 00 "Glazing."
 - 2. Section 09 91 00 "Painting" for field applied finish.

1.2 REFERENCES

- A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the references. Refer to Section 01 42 19 for information concerning availability and use of references.
- B. ASTM International:
 - 1. ASTM A1008 - Standard Specification for Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.
 - 2. ASTM A1011 - Standard Specification for Steel, Hot-Rolled Sheet and Strip, Commercial.
 - 3. ASTM A653 - Standard Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dipped Process.
 - 4. ASTM B117 - Standard Method of Salt Spray (Fog) Testing.
 - 5. ASTM D1735 - Standard Practice for Testing Water Resistance of Coating Using Water Fog Apparatus.
 - 6. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss in Building Partitions.
 - 7. ASTM E336 - Standard Test Method for Measurement of Airborne Sound Insulation in Buildings.
 - 8. ASTM E413 - Classification for Determination of Sound Transmission Class.
- C. Hollow Metal Manufacturers Association:
 - 1. HMMA 840 - Installation and Storage of Hollow Metal Doors and Frames.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Submit a schedule of items to be provided under this Section along with shop drawings in sufficient detail to show fabrication, installation, anchorage and interface of the work of this section with the work of adjacent trades.
- C. Schedule: Provide a schedule of sound control windows prepared using same reference numbers for details and openings as those on Drawings.

- D. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: Provide certification that the fixed window construction utilized has been tested at an independent laboratory in accordance with ASTM E90, and that the STC rating determined in accordance with ASTM E413, is not less than that specified in Part 2 of this Section.
1. The laboratory referenced in the certification must be qualified under the National Voluntary Accreditation Program (NVLAP) of the U.S. Bureau of Standards.
 2. Certification must reference laboratory name, test report number, and date of test; substitution of test data not in accordance with ASTM E90 and E413 will not be acceptable.
- B. Installation Instructions: Provide recommended installation procedures which, upon approval by the Architect, will become the basis for acceptance or rejection of the actual procedures used for installation.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide work of this Section designed and furnished by one manufacturer. Use a manufacturer who is ISO9001:2000 certified and has been engaged in the manufacture of Sound Retardant Metal Fixed Window systems for at least ten (10) years immediately prior to the start of this work, and who has a history of successful production acceptable to the Architect.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Receipt: Upon receipt of product, all materials shall be thoroughly inspected and all discrepancies, deficiencies and/or damages shall be immediately reported to the supplier in writing.
- B. Storage: Store all materials on planks or dunnage in a dry location in a vertical position, spaced by blocking to permit air circulation between units. Cover all material or store in a controlled area to protect from damage.

1.7 WARRANTY

- A. Warranty: Upon completion of the work of this Section, provide the Architect with two (2) copies of the manufacturer's standard written one (1) year warranty.

PART 2 - PRODUCTS

2.1 DESIGN

- A. Basis-of-Design Product: Sound Retardant Metal Fixed Window System designs are based on those manufactured by Overly Door Company, Greensburg, PA 15601. Tel 800-979-7300, Fax 724-830-2871.
- B. Performance: Sound Retardant Metal Fixed Window System to be Overly Model No. 4292276 or equal with STC rating of 42 when tested as a system in accordance with ASTM E90 and ASTM E413.

- C. Components: Assemblies to be complete with metal frame, glass, and glazing. Glass, and glazing shipped loose to be field installed.

2.2 FABRICATION

- A. Materials: Sound Retardant Metal Fixed Window Frames to be constructed from formed sheet steel or structural shapes and bars.
 - 1. Sheet steel: Commercial quality, level, cold rolled steel conforming to ASTM A1008 or hot rolled, pickled and oiled steel conforming to ASTM A1011.
 - 2. Steel shapes: ASTM A36.
 - 3. Steel bars: ASTM A108, Grade 1018.
- B. Frame Design: Sound Retardant Metal Fixed Window Frames shall be 14 gauge minimum welded units with integral trim and shipped with temporary spreader. Knock-down frames are not acceptable, unless sizes of frames exceed shipping limitations. After installation, field splices required because of shipping limitations must be field welded by certified welders per manufacturer's instructions and in accordance with AWS D1.1/D1.3.
- C. Anchors: Provide suitable anchors to properly install frames in partition types shown on Architects drawings.
- D. Glazing: 3/4" Laminated Glass, as specified in Section 08 80 00 "Glazing."
- E. Painting and Cleaning: After fabrication of frames, remove all tool marks and surface imperfections and dress smooth exposed faces of all welded joints. Chemically treat all surfaces to insure maximum paint adhesion and coat with manufacturer's standard water-based rust-inhibitive primer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prior to installation, secure the services of a qualified representative of the manufacturer to visit the job site and instruct the contractor's personnel in proper installation and adjustment of the assemblies or secure services of manufacturer's factory trained and authorized installer to perform installation of assemblies.

3.3 INSTALLATION

- A. Install work of this Section in strict accordance with approved shop drawings and manufacturer's recommended installation instructions. Where installations require field welding, all work must be performed by certified welders in accordance with AWS D1.1/D1.3.

3.4 MANUFACTURER SERVICES

- A. Upon installation, secure the services of a qualified representative of the manufacturer to visit the jobsite and inspect the complete installation of the fixed window assemblies, and direct installer in correcting any non-conforming items found.

END OF SECTION

06/06/18

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.
- B. This Section includes the following, but is not necessarily limited to:
 - 1. Door Hardware, including electric hardware.
 - 2. Storefront and Entrance door hardware.
 - 3. Low-energy door operators plus sensors and actuators.
 - 4. Thresholds, gasketing and weather-stripping.
 - 5. Door silencers or mutes.
- C. Related Sections: The following sections are noted as containing requirements that relate to this Section, but may not be limited to this listing.
 - 1. Section 08 11 13 - Hollow Metal Doors and Frames.
 - 2. Section 08 14 16 - Flush Wood Doors.
 - 3. Section 08 41 13 - Aluminum-Framed Entrances and Storefront.
 - 4. Division 28: Section - Fire/Life-Safety Systems & Security Access Systems.

1.03 REFERENCES (USE DATE OF STANDARD IN EFFECT AS OF BID DATE.)

- A. 2016 California Building Code, CCR, Title 24.
- B. BHMA – Builders' Hardware Manufacturers Association
- C. DHI – Door and Hardware Institute
- D. NFPA - National Fire Protection Association.
 - 1. NFPA 80 - Fire Doors and Other Opening Protectives
 - 2. NFPA 105 - Smoke and Draft Control Door Assemblies
- E. UL - Underwriters Laboratories.
 - 1. UL 10C - Fire Tests of Door Assemblies
 - 2. UL 305 - Panic Hardware
- F. WHI - Warnock Hersey Incorporated
- G. SDI - Steel Door Institute

1.04 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. 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. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

1.05 PRE-INSTALLATION CONFERENCE

- A. Convene a pre-installation conference at least one week prior to beginning work of this section.
- B. Attendance: Architect, Construction Manager, Contractor, Security Contractor, Hardware Supplier, Installer, Key District Personnel, and Project Inspector.
- C. Agenda: Review hardware schedule, products, installation procedures and coordination required with related work. Review District's keying standards.

1.06 SUBMITTALS AND SUBSTITUTIONS

- A. General: Submit in accordance with Conditions of the Contract and Division 1 Specification sections.
- B. Submit product data (catalog cuts) including manufacturers' technical product information for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
- C. Submit six (6) copies of schedule organized vertically into "Hardware Sets" with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:
 - 1. Include a Cover Sheet with;
 - a. Job Name, location, telephone number.
 - b. Architects name, location and telephone number.
 - c. Contractors name, location, telephone number and job number.
 - d. Suppliers name, location, telephone number and job number.
 - e. Hardware consultant's name, location and telephone number.
 - 2. Job Index information included;
 - a. Numerical door number index including; door number, hardware heading number and page number.
 - b. Complete keying information (referred to DHI hand-book "Keying Systems and Nomenclature"). Provision should be made in the schedule to provide keying information when available; if it is not available at the time the preliminary schedule is submitted.
 - c. Manufacturers' names and abbreviations for all materials.
 - d. Explanation of abbreviations, symbols, and codes used in the schedule.
 - e. Mounting locations for hardware.
 - f. Clarification statements or questions.
 - g. Catalog cuts and manufacturer's technical data and instructions.
 - 3. Vertical schedule format sample:

Heading Number 1 (Hardware group or set number – HW -1)					
			(a) 1 Single Door #1 - Exterior from Corridor 101	(b) 90°	(c) RH
			(d) 3' 0"x7' 0" x 1-3/4" x (e) 20 Minute (f) WD x HM		
(g) 1	(h)	(i) ea	(j) Hinges - (k) 5BB1HW 4.5 x 4.5 NRP (l) ½ TMS	(m) 626	(n) IVE
2	6AA	1 ea	Lockset - ND50PD x RHO x RH x 10-025 x JTMS	626	SCH

(a) - Single or pair with opening number and location. (b) - Degree of opening (c) - Hand of door(s) (d) - Door and frame dimensions and door thickness. (e) - Label requirements if any. (f) - Door by frame material. (g) - (Optional) Hardware item line #. (h) - Keyset Symbol. (i) - Quantity. (j) - Product description. (k) - Product Number. (l) - Fastenings and other pertinent information. (m) - Hardware finish codes per ANSI A156.18. (n) - Manufacture abbreviation.

- D. Make substitution requests in accordance with Division 1. Substitution requests must be made prior to bid date. Include product data and indicate benefit to the project. Furnish samples of any proposed substitution.
- E. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
- F. Templates for doors, frames, and other work specified to be factory prepared for the installation of 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.

1.07 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals.
- B. Schedules: Final door hardware and keying schedule.
- C. Furnish as-built/as-installed schedule with close-out documents, including keying schedule and transcript, wiring/riser diagrams, manufacturers' installation and adjustment and maintenance information.
- D. Fire Door Assembly Testing: Submit a written record of each fire door assembly to the Owner to be made available to the Authority Having Jurisdiction (AHJ) for future building inspections.

1.08 MAINTENANCE MATERIAL SUBMITTALS

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

1.09 QUALITY ASSURANCE

- A. Obtain each type of hardware (latch and lock sets, hinges, closers, exit devices, etc.) from a single manufacturer.
- B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the project's vicinity, that has a record of successful in-service performance for

supplying door hardware similar in quantity, type, and quality to that indicated for this project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.

1. Responsible for detailing, scheduling and ordering of finish hardware.
 2. Meet with Owner to finalize keying requirements and to obtain final instructions in writing.
 3. Stock parts for products supplied and are capable of repairing and replacing hardware items found defective within warranty periods.
- C. Hardware Installer: Company specializing in the installation of commercial door hardware with five years documented experience.
- D. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not.
1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".
- E. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Coordinate delivery of packaged hardware items to the appropriate locations (shop or field) for installation.
- B. Hardware items shall be individually packaged in manufacturers' original containers, complete with proper fasteners. Clearly mark packages on outside to indicate contents and locations in hardware schedule and in work.
- C. Provide locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, etc.
- D. Contractor to inventory door hardware jointly with representatives of hardware supplier and hardware installer until each all are satisfied that count is correct.

1.11 WARRANTY

- A. Provide warranties of respective manufacturers' regular terms of sale from day of final acceptance as follows:
 1. Locksets: Ten (10) years.
 2. Closers: Thirty (30) years.
 3. Exit devices: Three (3) years.
 4. All other hardware: Two (2) years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

<u>Item</u>	<u>Manufacturer</u>	<u>Acceptable Substitutes</u>
Hinges	Ives	Hager, Stanley, McKinney
Locks, Latches & Cylinders	Schlage	Or Approved Equal
Exit Devices	Von Duprin	Or Approved Equal
Closers	LCN	Or Approved Equal
Push, Pulls & Protection Plates	Ives	Trimco, BBW, DCI
Flush Bolts	Ives	Trimco, BBW, DCI
Dust Proof Strikes	Ives	Trimco, BBW, DCI
Coordinators	Ives	Trimco, BBW, DCI
Stops	Ives	Trimco, BBW, DCI
Overhead Stops	Glynn-Johnson	Or Approved Equal
Thresholds	Zero	Pemko, National Guard
Seals & Bottoms	Zero	Pemko, National Guard

2.02 MATERIALS

- A. Hinges: Exterior out-swinging door butts shall be non-ferrous material and shall have stainless steel hinge pins. All doors to have non-rising pins.
1. Hinges shall be sized in accordance with the following:
 - a. Height:
 - 1) Doors up to 42" wide: 4-1/2" inches.
 - 2) Doors 43" to 48" wide: 5 inches.
 - b. Width: Sufficient to clear frame and trim when door swings 180 degrees.
 - c. Number of Hinges: Furnish 3 hinges per leaf to 7'-5" in height. Add one for each additional 2 feet in height.
 2. Furnish non-removable pins (NRP) at all exterior out-swing doors and interior key lock doors with reverse bevels.
- B. Continuous Hinges: As manufactured by Ives, an Allegion Company. UL rated as required.
- C. Heavy Duty Cylindrical Locks and Latches: Schlage "ND" Series as scheduled with "Rhodes" design, fastened with through-bolts and threaded chassis hubs.
1. Provide cylindrical locksets exceeding the ANSI/BHMA A156.2 Grade 1 performance standards for strength, security, and durability in the categories below:
 - a. Abusive Locked Lever Torque Test – minimum 3,100 inch-pounds without gaining access.
 - b. Offset lever pull – minimum 1,600 foot pounds without gaining access.
 - c. Vertical lever impact – minimum 100 impacts without gaining access.

2. Cycle life - tested to minimum 16 million cycles per ANSI/BHMA A156.2 Cycle Test with no visible lever sag or use of performance aids such as set screws or spacers.
3. UL 10C for 4'-0" x 10'-0" 3-hour fire door.
4. Cylinders: Refer to "KEYING" article, herein.
5. Provide solid steel anti-rotation through bolts and posts to control excessive rotation of lever.
6. Provide lockset that allows lock function to be changed to over twenty other common functions by swapping easily accessible parts.
7. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2 inch latch throw capable of UL listing of 3 hours on a 4' x 10' opening. Provide proper latch throw for UL listing at pairs.
8. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
9. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
10. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
11. Provide wired electrified options as scheduled in the hardware sets.
 - a. 12 through 24 volt DC operating capability, auto-detecting
 - b. Selectable EL (fail safe)/EU (fail secure) operating mode via switch on chassis
 - c. 0.230A (230mA) maximum current draw.
 - d. 0.010A (10mA) holding current.
 - e. Modular / "plug in" request to exit switch.
12. Lever Trim: Solid cast levers without plastic inserts, and wrought roses on both sides.

D. Exit devices: Von Duprin as scheduled.

1. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 - 2001 standards.
2. All internal parts shall be of cold-rolled steel with zinc dichromate coating.
3. Mechanism case shall have an average thickness of 0.140".
4. Compression spring engineering.
5. Non-handed basic device design with center case interchangeable with all functions.
6. All devices shall have quiet return fluid dampeners.
7. All latchbolts shall be deadlocking with 3/4" throw and have a self-lubricating coating to reduce friction and wear.
8. Device shall bear UL label for fire and or panic as may be required.
9. All surface strikes shall be roller type and utilize a plate underneath to prevent movement.
10. Removable Mullions: Removable with single turn of building key. Securely reinstalled without need for key.
11. Furnish glass bead kits for vision lites where required.
12. All Exit Devices to be sex-bolted to the doors.
13. Panic Hardware shall comply with CBC Section 11B.404.2.7 and shall be mounted between 34" and 44" above the finished floor surface.
 - a. Provide exit devices UL certified to meet maximum 5 pound requirements according to the California Building Code section 11B-309.4, and UL listed for Panic Exterior Fire Exit Hardware.

E. Closers: LCN as scheduled. Place closers inside building, stairs, room, etc.

1. Door closer cylinders shall be of high strength cast iron construction with double heat treated pinion shaft to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.
2. All door closers shall be fully hydraulic and have full rack and pinion action with a shaft diameter of a minimum of 11/16 inch and piston diameter of 1 inch to ensure longevity and durability under all closer applications.

3. All parallel arm closers shall incorporate one piece solid forged steel arms with bronze bushings. 1-9/16" steel stud shoulder bolts, shall be incorporated in regular arms, hold-open arms, arms with hold open and stop built in. All other closers to have forged steel main arms for strength, durability, and aesthetics for versatility of trim accommodation, high strength and long life.
 4. All parallel arm closers so detailed shall provide advanced backcheck for doors subject to severe abuse or extreme wind conditions. This advanced backcheck shall be located to begin cushioning the opening swing of the door at approximately 45 degrees. The intensity of the backcheck shall be fully adjustable by tamper resistant non-critical screw valve.
 5. Closers shall be installed to permit doors to swing 180 degrees.
 6. All closers shall utilize a stable fluid withstanding temperature range of 120 degrees F. to -30 degrees F. without requiring seasonal adjustment of closer speed to properly close the door.
 7. Provide the manufactures drop plates, brackets and spacers as required at narrow head rails and special frame conditions. NO wood plates or spacers will be allowed.
 8. Maximum effort to operate closers shall not exceed 5 lbs., such pull or push effort being applied at right angles to hinged doors. Compensating devices or automatic door operators may be utilized to meet the above standards. When fire doors are required, the maximum effort to operate the closer may be increased but shall not exceed 15 lbs. when specifically approved by fire marshal. All closers shall be adjusted to operate with the minimum amount of opening force and still close and latch the door. These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position. Per 11B-404.2.8.1, door shall take at least 5 seconds to move from an open position of 90 degrees to a position of 12 degrees from the latch jamb.
- F. Flush Bolts and Dust Proof Strikes: Automatic Flush Bolts shall be of the low operating force design. Utilize the top bolt only model for interior doors where applicable and as permitted by testing procedures.
1. Manual flush bolts only permitted on storage or mechanical openings as scheduled.
 2. Provide dust proof strikes at openings using bottom bolts.
- G. Door Stops:
1. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
 2. Do not install floor stops more than four (4) inches from the face of the wall or partition (CBC Section 11B-307).
 3. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.
- H. Protection Plates: Fabricate either kick, armor, or mop plates with four beveled edges. Provide kick plates 10" high and 2" LDW. Sizes of armor and mop plates shall be listed in the Hardware Schedule. Furnish with machine or wood screws of bronze or stainless to match other hardware.
- I. Thresholds: As Scheduled and per details.
1. Thresholds shall not exceed 1/2" in height, with a beveled surface of 1:2 maximum slope.
 2. Set thresholds in a full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Division 7 "Thermal and Moisture Protection".
 3. Use 1/4" diameter fasteners, red-head flat-head sleeve anchors (SS/FHSL).
 4. Thresholds shall comply with CBC Section 11B-404.2.5.
- J. Seals: Provide silicone gasket at all rated and exterior doors.

1. Fire-rated Doors, Resilient Seals: UL10C Classified complies with NFPA 80 & NFPA 252. Coordinate with selected door manufacturers' and selected frame manufacturers' requirements.
 2. Fire-rated Doors, Intumescent Seals: Furnished by selected door manufacturer. Furnish fire-labeled opening assembly complete and in full compliance with UL10C Classified complies with NFPA 80 & NFPA 252. Where required, intumescent seals vary in requirement by door type and door manufacture -- careful coordination required.
 3. Smoke and Draft Control Doors, Provide UL10C Classified complies with NFPA 80 & NFPA 252 for use on "S" labeled Positive Pressure door assemblies.
- K. Door Shoes and Door Top Caps: Provide door shoes at all exterior wood doors and top caps at all exterior out-swing doors.
- L. Silencers: Furnish silencers for interior hollow metal frames, 3 for single doors, 2 for pairs of doors. Omit where sound or light seals occurs, or for fire-resistive-rated door assemblies.

2.03 KEYING

- A. Furnish a Schlage masterkey system as directed by the Owner or Architect.
- B. A detailed keying schedule is to be prepared by the owner and/or architect in consultation with a representative of the lock manufacturer. Each keyed cylinder on every keyed lock is to be listed separately showing the door #, key group (in BHMA terminology), cylinder type, finish and location on the door.
- C. Establish a new masterkey system for this project as directed by the keying schedule.
- D. Furnish all cylinders in the Schlage conventional style except the exit device and removable mullion cylinders which will be supplied in Schlage Full Size Interchangeable Core (FSIC). Pack change keys independently (PKI).
- E. Furnish construction keying for doors requiring locking during construction.
- F. Furnish mechanical keys as follows:
1. Furnish 2 cut change keys for each different change key code.
 2. Furnish 1 uncut key blank for each change key code.
 3. Furnish 6 cut masterkeys for each different masterkey set.
 4. Furnish 3 uncut key blanks for each masterkey set.
 5. Furnish 2 cut control keys cut to the top masterkey for permanent I/C cylinders.
 6. Furnish 1 cut control key cut to each SKD combination.
- G. Furnish Schlage Padlocks and the cylinders to tie them into the masterkey system for gates, storage boxes, utility valve security, roof hatches and roll-up doors keyed as directed in the keying schedule.

2.04 FINISHES

- A. Generally to be satin chrome US26D (626 on bronze and 652 on steel) unless otherwise noted.
- B. Furnish push plates, pull plates and kick or armor plates in satin stainless steel US32D (630) unless otherwise noted.
- C. Door closers shall be powder-coated to match other hardware, unless otherwise noted.

- D. Aluminum items to be finished anodized aluminum except thresholds which can be furnished as standard mill finish.

2.05 FASTENERS

- A. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal and standard wood screws for wood.
- B. Screws for butt hinges shall be flathead, countersunk, full-thread type.
- C. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.
- D. Provide expansion anchors for attaching hardware items to concrete or masonry.
- E. All exposed fasteners shall have a phillips head.
- F. Finish of exposed screws to match surface finish of hardware or other adjacent work.
- G. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are square and plumb and ready to receive work and dimensions are as instructed by the manufacturer.
- B. Beginning of installation means acceptance of existing conditions.
- C. Fire-Rated Door Assembly Inspection: Upon completion of the installation, all fire door assemblies shall be inspected to confirm proper operation of the closing device and latching device and that only the manufacturer's furnished fasteners are used for installation and that it meets all criteria of a fire door assembly per NFPA 80 (Standard for Fire Doors and Other Opening Protectives) 2013 Edition. A written record shall be maintained and transmitted to the Owner to be made available to the Authority Having Jurisdiction (AHJ). The inspection of the swinging fire doors shall be performed by a certified FDAI (Fire Door Assembly Inspector) with knowledge and understanding of the operating components of the type of door being subjected to the inspection. The record shall list each fire door assembly throughout the project and include each door number, an itemized list of hardware set components at each door opening, and each door location in the facility.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and requirements of DHI.
- B. Use the templates provided by hardware item manufacturer.
- C. Mounting heights for hardware shall be as recommended by the Door and Hardware Institute. Operating hardware will to be located between 34" and 44" AFF.
- D. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

- E. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- F. Set thresholds for exterior doors in full bed of butyl-rubber sealant.
- G. If hand of door is changed during construction, make necessary changes in hardware at no additional cost.

3.03 ADJUST AND CLEAN

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Clean adjacent surface soiled by hardware installation.
- C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy, return to that work area and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- D. Instruct Owner's Personnel in proper adjustment and maintenance of hardware finishes, during the final adjustment of hardware.
- E. Continued Maintenance Service: Approximately six months after the completion of the project, the Contractor accompanied by the Architectural Hardware Consultant, shall return to the project and re-adjust every item of hardware to restore proper functions of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.04 HARDWARE LOCATIONS

- A. Conform to CCR, Title 24, Part 2; and ADAAG; and the drawings for access-compliant positioning requirements for the disabled.

3.05 FIELD QUALITY CONTROL

- A. Contractor is responsible for providing the services of an Architectural Hardware Consultant (AHC) or a proprietary product technician to inspect installation and certify that hardware and its installation have been furnished and installed in accordance with manufacturers' instructions and as specified herein.

3.06 SCHEDULE

- A. The items listed in the following schedule shall conform to the requirements of the foregoing specifications.
- B. While the hardware schedule is intended to cover all doors, and other movable parts of the building, and establish type and standard of quality, the contractor is responsible for examining the Plans and Specifications and furnishing proper hardware for all openings whether listed or not. If there are any omissions in hardware groups in regard to regular doors

they shall be called to the attention of the Architect prior to bid opening for instruction; otherwise, list will be considered Complete. No extras will be allowed for omissions.

- C. The Door Schedule on the Drawings indicates which hardware set is used with each door.

Manufacturers Abbreviations (Mfr.)

GLY =	Glynn-Johnson Corporation	Overhead Door Stops
IVE =	Ives	Hinges, Pivots, Bolts, Coordinators, Dust Proof Strikes, Kick Plates, Door Stops & Silencers
LCN =	LCN	Door Closers
SCH =	Schlage Lock Company	Locks, Latches & Cylinders
VON =	Von Duprin	Exit Devices
ZER =	Zero International	Thresholds, Gasketing & Weather-stripping

SPEXTRA: 413400

HARDWARE GROUP NO. 01

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112HD	628	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
1	EA	PANIC HARDWARE	CD-PA-AX-98-EO	626	VON
1	EA	PANIC HARDWARE	CD-PA-AX-98-NL-OP-110MD	626	VON
1	EA	RIM CYLINDER	20-057	626	SCH
1	EA	MORTISE CYLINDER	26-091	626	SCH
2	EA	MORTISE CYLINDER	26-091 XQ11-948	626	SCH
2	EA	90 DEG OFFSET PULL	8190HD 12" L	630	IVE
2	EA	SURFACE CLOSER	4111 AVB EDA	689	LCN
2	EA	FLOOR STOP	FS18L	BLK	IVE
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	OFFSET THRESHOLD	103A-NH-223	A	ZER

WEATHER-STRIPPING FURNISHED WITH DOOR & FRAME ASSEMBLY

HARDWARE GROUP NO. 02

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	PANIC HARDWARE	CD-PA-AX-98-NL-OP-110MD	626	VON
1	EA	RIM CYLINDER	20-057	626	SCH
1	EA	MORTISE CYLINDER	26-091 XQ11-948	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	SURFACE CLOSER	4111 AVB 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	GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	OFFSET THRESHOLD	103A-NH-223	A	ZER

HARDWARE GROUP NO. 02A

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	PANIC HARDWARE	CD-PA-AX-98-NL-OP-110MD	626	VON
1	EA	RIM CYLINDER	20-057	626	SCH
1	EA	MORTISE CYLINDER	26-091 XQ11-948	626	SCH
1	EA	90 DEG OFFSET PULL	8190HD 12" L	630	IVE
1	EA	OH STOP	100S (ONLY FOR DOOR E13B)	630	GLY
1	EA	SURFACE CLOSER	4111 AVB EDA	689	LCN
1	EA	FLOOR STOP	FS18L (ONLY FOR DOOR E13C)	BLK	IVE
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	OFFSET THRESHOLD	103A-NH-223	A	ZER

WEATHER-STRIPPING FURNISHED WITH DOOR & FRAME ASSEMBLY

HARDWARE GROUP NO. 03

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	VANDL CLASSROOM SEC	ND95PD RHO XN12-035	626	SCH
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	FLOOR STOP	FS18L	BLK	IVE
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	657A-NH-223	A	ZER

WEATHER-STRIPPING FURNISHED WITH DOOR & FRAME ASSEMBLY

HARDWARE GROUP NO. 04

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	PANIC HARDWARE	LD-PA-AX-98-L-2SI-06	626	VON
2	EA	RIM CYLINDER	20-057	626	SCH
1	EA	SURFACE CLOSER	4111 AVB EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS439	682	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER

HARDWARE GROUP NO. 05

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2	EA	CONT. HINGE	112HD	628	IVE
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-98-L-2SI-06	626	VON
2	EA	RIM CYLINDER	20-057	626	SCH
1	EA	MORTISE CYLINDER	26-091	626	SCH
2	EA	SURFACE CLOSER	4111 AVB EDA	689	LCN
2	EA	FLOOR STOP	FS441	613	IVE

HARDWARE GROUP NO. 06

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
			RE-USE EXISTING DOORS, FRAMES, & HARDWARE		

HARDWARE GROUP NO. 07

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	CLASSROOM SECURITY	ND75PD RHO XN12-035	626	SCH
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	FLOOR STOP	FS439	682	IVE

GASKETING FURNISHED WITH ALUMINUM FRAME ASSEMBLY

HARDWARE GROUP NO. 08

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	ENTRANCE/OFFICE LOCK	ND50PD RHO	626	SCH
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS439	682	IVE

GASKETING FURNISHED WITH ALUMINUM FRAME ASSEMBLY

HARDWARE GROUP NO. 09

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	PASSAGE SET	ND10S RHO	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS439	682	IVE

GASKETING FURNISHED WITH ALUMINUM FRAME ASSEMBLY

HARDWARE GROUP NO. 10

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	CLASSROOM SECURITY	ND75PD RHO XN12-035	626	SCH
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS439	682	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	GASKETING	312A-S	A	ZER
1	EA	DOOR BOTTOM	360AA	AA	ZER

HARDWARE GROUP NO. 11

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	CLASSROOM LOCK	ND70PD RHO	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	GASKETING	312A-S	A	ZER
1	EA	DOOR BOTTOM	350A	A	ZER
1	EA	THRESHOLD	657A-NH-223	A	ZER

HARDWARE GROUP NO. 12

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	STOREROOM LOCK	ND80PD RHO	626	SCH
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	GASKETING	312A-S	A	ZER
			RE-USE BALANCE OF DOOR, FRAME & HARDWARE		

HARDWARE GROUP NO. 13

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	ND80PD RHO	626	SCH
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP/HOLDER	FS41	626	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER

HARDWARE GROUP NO. 14

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	FIRE EXIT HARDWARE	PA-AX-98-L-F-2SI-06	626	VON
2	EA	RIM CYLINDER	20-057	626	SCH
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
			RE-USE BALANCE OF DOOR, FRAME & HARDWARE		

HARDWARE GROUP NO. 15

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	STOREROOM LOCK	ND80PD RHO	626	SCH
1	EA	SURFACE CLOSER	4011	689	LCN
			RE-USE BALANCE OF DOOR, FRAME & HARDWARE		

HARDWARE GROUP NO. 16

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CLASSROOM SECURITY	ND75PD RHO XN12-035	626	SCH
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	GASKETING	188SBK PSA	BK	ZER
			RE-USE BALANCE OF DOOR, FRAME & HARDWARE		

END OF SECTION

06/08/18

SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Glass for windows, doors, and interior and exterior storefront framing.
2. Glazing sealants and accessories.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES

A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

American National Standards Institute (ANSI)
ASTM International (ASTM)
American Architectural Manufacturers Association (AAMA)
Glass Association of North America (GANA)
Insulating Glass Certification Council (IGCC)
Underwriter's Laboratories, Inc. (UL)

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product other than clear monolithic vision glass submit the following products; 12 inches square.

1. Laminated glass.
 2. Insulating glass.
- C. Glazing Accessory Samples: For gaskets, sealants and colored spacers, in 12-inch lengths.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- E. Submittal procedures and quantities are specified in Section 01 33 00.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturers of insulating-glass units with sputter-coated, low-E coatings.
- B. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
- C. Product Test Reports: For insulating glass, for tests performed by a qualified testing agency. Submit test reports from the manufacturer of the insulating glasses demonstrating compliance with the performance requirements of this section.
- D. Sample Warranties: For special warranties.

1.7 REGULATORY REQUIREMENTS

- A. Glass and glazing shall conform with the CBC Title 24 Part 2 Chapter 24 - Glass and Glazing, and to Consumer Product Safety Commission regulation (CPSC) 16 CFR, Part 1201.
- B. Where safety glass is indicated or required, provide glazing materials that conform to ANSI Z97.1-2004 and CPSC16CFR, Part 1201 and are so identified in accordance with CBC Title 24 Part 2 Sec. 2406.2.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Do not deliver glass to the site until the areas to be glazed are ready to receive the glass. Deliver glass in manufacturers storage cases with interleaving between lights. Deliver glazing compound in manufacturer's original cartons with labels intact.
- B. Storage: Store glass in original storage cases. Store cases in a dry, well ventilated area with temperatures maintained above the dew point. Do not store glass where it will be exposed to direct sunlight.
- C. Handling: Do not unpack glass until needed for installation. Handle and install materials in a manner to prevent breakage, scratching or other damage. Keep vacuum cups free from foreign material that would scratch glass.

- D. Take special care to prevent damage to factory clean cut edges of reflective glass, and tinted glass during delivery, storage, and handling.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.
- B. Provide sufficient ventilation to prevent condensation from forming on surfaces to be glazed.

1.11 WARRANTY

- A. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Clear Float Glass: Acceptable manufacturers or equal:

AGC Flat Glass, Inc.; www.agc.com
Guardian Industries Corp.; www.guardian.com
Viracon, Inc.; www.viracon.com
Vitro Architectural Glass (formerly PPG Industries, Inc.) www.vitroglazings.com

- B. Laminated Glass: Acceptable manufacturers or equal:

AGC Flat Glass, Inc.; www.agc.com
Guardian Industries Corp.; www.guardian.com
Interpane Glas Industrie AG; www.interpane.com
Oldcastle Glass Co.; www.oldcastlebe.com
Standard Bent Glass Corp; www.standardbent.com
Viracon, Inc.; www.viracon.com

C. Insulating Glass: Acceptable manufacturers or equal:

AGC Flat Glass, Inc.; www.agc.com
Guardian Industries Corp.; www.guardian.com
Interpane Glas Industrie AG; www.interpane.com
Oldcastle Glass Co.; www.oldcastlebe.com
Viracon, Inc.; www.viracon.com
Vitro Architectural Glass (formerly PPG Industries, Inc.) www.vitroglazings.com

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: Defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.
1. Design Wind Pressures: As indicated on Drawings.
- C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
 2. For laminated-glass lites, properties are based on products of construction indicated.
 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3, unless otherwise indicated.
- B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3. Drawing Designation: GT-2.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- C. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.5 LAMINATED GLASS Drawing Designation: (GT-3).

- A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - 1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written instructions.
 - 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 - 3. Interlayer Color: Clear unless otherwise indicated.
- B. Basis-of-Design Product: 3/4" Acousta-Pane® 43 by Standard Bent Glass Corp. or equal.
 - 1. Construction: 1/4" Annealed glass + 0.030" Polyvinyl Butyral (pvb) + 1/4" Annealed Glass + 0.030" Polyvinyl Butyral (pvb) + 1/4" Annealed Glass.
 - 2. Thickness: 3/4" Nominal.

2.6 INSULATING GLASS

- A. Insulating Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 2190 and with requirements specified in this Article.
 - 1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass

- lites and to comply with glass design requirements specified in Part 1 Performance Requirements Article.
2. Provide Kind FT (fully tempered) glass lites where safety glass is indicated or required.
 3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
 4. Sealing System: Comply with requirements in Section 07 92 00 "Joint Sealants." Dual seal, with primary and secondary sealants of polyisobutylene and silicone.
 5. Spacer Specifications: Manufacturer's standard spacer material and construction complying with the following requirements:
 - a. Spacer Material: Aluminum with mill or clear anodic finish.
 - b. Desiccant: Molecular sieve or silica gel, or blend of both.
 - c. Corner Construction: Manufacturer's standard corner construction
- B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190, and complying with other requirements specified.
- C. Uncoated Glass Type: Clear Insulating Glass. Drawing Designation (GT-1).
1. Product: Clear Insulating Glass Clear + Clear by Vitro Architectural Glass; or equal.
 2. Outdoor Lite: Clear (transparent) Float Glass.
 3. Indoor Lite: Clear (transparent) Float Glass.
 4. Performance Values:
 - a. Visible Light Transmittance: 79%
 - b. U-Value Winter: 0.47
 - c. U-Value Summer: 0.50
 - d. SHGC: 0.70
 - e. Shading Coefficient: 0.81
 - e. Outdoor Visible Light Reflectance: 15%
 5. Approved Manufacturers: Vitro Certified™ Fabricator Required.
 6. Certification: Both lites to be Cradle-to-Cradle certified, minimum Bronze Level, by Cradle-to-Cradle Products Innovation Institute (www.c2ccertified.org).
 7. Outdoor Appearance: Clear.
 8. Insulating Unit Construction: 1/4" (6mm) glass + 1/2" (13mm) air space + 1/4" (6mm) glass.
- D. Type: Low-E Coated, Clear Insulating Glass. Drawing Designation: (GT-2).
1. Product: Solarban® 70XL (2) + Clear by Vitro Architectural Glass; or equal.
 2. Outdoor Lite: 1/4-inch (6mm) Solarban 70XL solar control (Sputtered) on second surface (2).
 3. Cavity: 1/2" air space.
 4. Indoor Lite: 1/4-inch clear float glass (tempered where required).
 5. Performance Values:
 - a. Visible Light Transmission: 64%
 - b. SHGC: 0.27
 - c. U-value Winter: 0.28
 - d. Outdoor Visible Light Reflectance: 12%
 6. Approved Manufacturers: Vitro Certified™ Fabricator Required.
 7. Certification: Both lites to be Cradle-to-Cradle certified, minimum Bronze Level, by Cradle-to-Cradle Products Innovation Institute (www.c2ccertified.org).
 8. Outdoor Appearance: Clear.
 9. Insulating Unit Construction: 1/4" (6mm) glass + 1/2" (13mm) air space + 1/4" (6mm) glass.

2.7 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use G.

2.8 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Acceptable products or approved equal:

1. Pecora Corp.; Extru-Seal Preshimmed Tape
2. Protective Treatments Inc.; PTI 303 Spacer Rod Tape
3. Tremco; Preshimmed 440 Tape

2.9 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: EPDM, neoprene or silicone, 70-90 Durometer (Shore A) hardness.

D. Spacers: EPDM, neoprene or silicone, 50-60 Durometer (Shore A) hardness.

E. Clips for Metal Surrounds: Respective surround manufacturer's standard, (steel to steel, aluminum to aluminum, etc.).

F. Preformed Gaskets: Closed cell sponge neoprene conforming to ASTM C509 and dense neoprene wedge gaskets conforming to ASTM C864. Gaskets shall be preformed to shapes and sizes to suit the glazing stops furnished with the doors, windows, and storefront and to compress the sponge neoprene gasket 25 percent to 40 percent.

2.10 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
 - 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION

06/06/18

SECTION 09 05 61.13

MOISTURE VAPOR EMISSION CONTROL

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes: Fluid-applied, resin-based, membrane-forming systems that control the moisture-vapor emission rate of high-moisture, interior concrete to prepare it for floor covering installation. Vapor-Proof all concrete floor slabs scheduled to receive resilient flooring or sheet carpeting. Provide substrate suitable for installation of flooring by other sections to ensure provision of full warranty and service life of those finishes.
- B. Vapor control coating application shall include shot blasting, coating application and cement topcoat layer to create a sustainable system for future flooring updates and replacements.
 - 1. Specialty curing, sealing, vapor-control coatings do not meet the intent of this section.
- C. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- D. Related Sections:
 - 1. Section 09 65 19 - Resilient Tile Flooring.
 - 2. Section 09 65 43 - Linoleum Flooring.
 - 3. Section 09 68 16 - Sheet Carpeting.

1.02 REFERENCES

- A. The editions of standards and specifications published by the following organizations, and referenced herein, apply to the work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.
- B. ASTM International:
 - 1. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
 - 2. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
 - 3. ASTM E96 - Standard Test Methods For Water Vapor Transmission of Materials.
 - 4. ASTM F1869 - Standard Test Method For Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 - 5. ASTM F710 - Standard Test Method for Preparing Floors To Receive Resilient Flooring.
 - 6. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

1.03 DEFINITIONS

- A. MVE: Moisture vapor emission.
- B. MVER: Moisture vapor emission rate.

1.04 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.05 ACTION SUBMITTALS

- A. See Section 01 33 00 – Submittals, for Submittal procedures.
- B. Specified Product:
 - 1. Product Data: Provide data for concrete floor cleaning, coating and preparation materials.
 - 2. Installation methods: Indicate procedures and process.
 - 3. Mixing data.
 - 4. Installer Certificate: Manufacturer's acceptance of applicator.
 - 5. Warranty: Submit manufacturer's standard warranty, as specified.
- C. Alternate Products:
 - 1. Product Data: All products being used in the assembly of the control coating system.
 - 2. Installation Data: Indicate procedures and process.
 - 3. Laboratory Testing: Current independent laboratory reports. Reports shall be no greater than 2 years of age. Older test reports are not acceptable.
 - 4. Installer Certificate: Manufacturer's approved applicator's certificates for a warranted system.
 - 5. Warranty: Manufacturer's standard warranty certificate, including any and all exclusions.
 - 6. Insurance Certificate: Submit manufacturer's product liability insurance certificate.

1.06 QUALITY ASSURANCE

- A. Coating Manufacturer Qualifications:
 - 1. Products with VOC content of less than 65 g/liter and contribute to LEED points.
 - 2. Formula meets the California Department of Health Services emission chamber testing.
 - 3. Maintains long term warranty product liability insurance in the amount of \$6,000,000 per occurrence and capable of listing Owner as additionally insured.
 - 4. Employs factory-trained personnel who are available for consultation and Project-site inspection.
- B. Installer Qualifications: Company approved, licensed and certified for the application of manufacturer's product.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating directions for storage and mixing with other components.

1.08 ENVIRONMENTAL REQUIREMENTS

- A. Maintain temperatures of 55 to 85 degrees, 72 hours prior to, during and after application.

1.09 WARRANTY

- A. Correct defective Work within a fifteen (15) year period after Date of Substantial Completion. Manufacturer's warranty shall cover vapor emission coating failure including but not limited to suppression of water vapor emission, alkalinity and migrating salts through concrete surfaces. Emission levels after application shall meet flooring manufacturer's tolerances.
 - 1. Installation shall include a cement topcoat to provide a sustainable surface for future flooring updates and replacements to allow warranty coverage to be extended.
- B. For warranty repair work, remove and replace flooring products, vapor emission coating; provide required preparation materials and labor.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Provide product by one of the following manufacturers meeting specified requirements:
 - 1. Synthetics International; "Synthetic30™"; Phone: (866) 646-0356.
 - 2. Diamond Stone Products; "Vapor Reduction System"; Phone: (888) 817-8663).
 - 3. Additional Manufacturers: None identified.
- B. Basis-of-Design Product: Synthetic30™. Synthetic30 is a two-component waterborne polymer designed to penetrate concrete slabs and seal cracks, joints and slab imperfections. The special resins allow the polymers to saturate porous concrete and embed a dense, high compressive film strength within the concrete to restrict water vapor emission, alkalinity migration and 100% relative humidity transfer. The product may be covered with a moisture sensitive flooring system or used as a stand-alone floor finish.
 - 1. Synthetic30's polymers improve the adhesion of flooring products by forming a surface that is unaffected by alkalinity and maintains moisture compliance. Flooring systems applied over the treated surface will exceed applications over concrete alone for compatibility.

2.02 VAPOR EMISSION COATING – PERFORMANCE REQUIREMENTS

- A. Coating shall be third party laboratory tested in accordance with the following:
 - 1. Water Vapor Transmission - WRT:
 - a. ASTM E96 Grains/ft²/hr of less than 0.6
 - b. ASTM E96 Pounds/1000ft²/ 24 hours of less than 2.0
 - c. ASTM E96 grams/h · m² of less than 0.7
 - 2. Water Vapor Permeance - WVP:
 - a. ASTM E96 Perms (inch-pounds) of less than 1.4
 - b. ASTM E96 Grams/Pa · s · m² x 10⁻¹⁰ of less than 8.1
 - c. ASTM E96 Nanograms/ Pa · s · m² of less than 81.1
 - 3. Alkali Resistance - 30 days:
 - a. ASTM D1308 - Resistant to 35% potassium hydroxide exposure
 - b. ASTM D1308 – Resistant to 14pH solution exposure

4. Concrete Adhesion - Pull off:
 - a. ASTM D4541 Adhesion of 375 to 600psi (100% concrete cohesive failure)
 5. Low Emitting - VOC Content:
 - a. EPA Method 24 testing of less than 62 g/liter
 - b. Meets requirements of LEED EQ Credit 4.1
 - c. Contains no formaldehyde, formaldehyde precursors and zero-carcinogens
 - d. Contains zero hazardous air pollutants (HAP's)
 - e. Meets Section 01350 - California Department of Health Services Standard practice requirements for classroom and office space.
- B. Coating Properties: Liquid applied penetrate and coating for suppressing, controlling and restricting water vapor emissions of 15 pounds and alkalinity resistance of 14pH.
1. Shall be a two-component, two-coat application of a proprietary low viscosity, polymers which form a highly insoluble film property resistant to 14pH (ASTM D1308) and water vapor reduction of 95 percent (ASTM E96).
 2. Remain resistant to 100% RH per ASTM F2170 In-Situ Relative humidity exposure.
 3. Application shall maintain a water vapor emission rate of less than 2.0 lbs. per ASTM F1869 during warranty period.

2.03 ACCESSORIES

- A. Moisture Tolerant Primer: Two-component, low viscosity liquid for chemically bonding cement products to vapor control coating surfaces.
- B. Crack-Filling Material: Resin-based material recommended in writing by MVE-control system manufacturer for sealing concrete substrate crack repair.
- C. Cement Topcoat: Portland cement, single-component floor prep product by RAECO Cements (877) 763-1330 www.raecoinc.com; or equal. Product shall be applied at a nominal 1/8 inch thickness.
- D. ASTM F1869 Water Vapor Emission Test Kits: American Moisture Test, Inc. (866/670-9700)

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of the Work.
- B. Verify substrates meet manufacturer's requirements before starting work.
- C. Verify items which penetrate substrate to receive coating are securely installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.
 1. Installation of system indicates acceptance of surfaces and conditions.

3.02 PREPARATION

- A. Concrete Substrates: Prepare and clean substrates according to MVE-control system manufacturer's written instructions to ensure adhesion of system to concrete.
- B. Remove foreign materials detrimental to system, such as curing compounds, sealers, loose patching materials or surface oil. Foreign materials shall be removed by shot blasting with #390 to #420 shot.
- C. Vacuum clean all surfaces to remove dust, debris and shot. Do not acid etch or use clean sweeping agents.
- D. Protect walls, floor openings, electrical openings, door frames, and other obstructions during installation.

3.03 MIXING

- A. Read and follow manufacturer's technical, mixing and safety data prior to use. Do not mix partial units. Re-mix product that sits longer than 20 minutes during application.

3.04 APPLICATION

- A. General: Install MVE-control system according to ASTM F 3010 and manufacturer's written instructions to produce a uniform, monolithic surface free of surface deficiencies such as pin holes, fish eyes, and voids.
 - 1. Install primers as required to comply with manufacturer's written instructions.
- B. Verify that surfaces are solid, free of loose particles, cracks, pits, rough projections or foreign matter detrimental to maximum adhesion of the system.
- C. When surface temperatures exceed 80 deg F, pre-dampen concrete with clean water using an airless sprayer.
- D. Allow the product to completely saturate the surface (approx. 20 min); broom areas that puddle.
- E. Pour product on designated concrete surfaces; drag with a squeegee, lint-free nap roller and/or nylon broom to saturate the concrete surface.
- F. Apply coating to saturate surface, cracks and joints in accordance with manufacturer's spread rates and curing requirements.
- G. Surface may be walked on during application wearing spike shoes.
- H. Spread evenly over the entire surface following specified spread rates.
- I. Use fans to increase air movement after application.
- J. Verify concrete temperature and interior humidity to allow proper drying.
- K. Typical curing times at 75 deg F - 30% RH with proper ventilation:
 - 1. Latex/ Acrylic Adhesives: 12 hrs. Epoxy Products: 24 hours.
 - 2. Urethane Products: 24 hrs. Non-Porous Primer: 12 - 24 hours.

- L. Cure MVE-control system components according to manufacturer's written instructions. Prevent contamination or other damage during installation and curing processes.
- M. After curing, examine MVE-control system for surface deficiencies. Repair surface deficiencies according to manufacturer's written instructions.
- N. Install cement top-coat (patching-leveling product) over cured membrane if required to maintain manufacturer's warranty and in thickness required to maintain the warranty.
 - 1. Apply moisture tolerant primer to secure all cement patching-leveling products to MVE-control coating.
 - 2. Mix and apply cement topcoat product to provide a smooth floor surface for flooring. This surface will offer a sustainable surface for future flooring updates and replacements.

3.05 PROTECTION

- A. Protect MVE-control system from damage, wear, dirt, dust, and other contaminants before floor covering installation. Use protective methods and materials, including temporary coverings, recommended in writing by MVE-control system manufacturer.
- B. Do not allow subsequent preinstallation examination and testing for floor covering installation to damage, puncture, or otherwise compromise the MVE-control system membrane.

END OF SECTION

06/06/18

SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Non-load-bearing steel framing systems for interior partitions,
2. Suspension and furring systems for interior ceilings and soffits.
3. Suspension and furring systems for exterior soffits.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Sections:

1. Section 05 40 00 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; and ceiling joists.
2. Section 09 51 13 "Acoustical Panel Ceilings" for suspension systems for acoustical ceilings.

1.2 REFERENCES

A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

ASTM International
American Iron and Steel Institute (AISI)
ASCE 7-05, Section 13.5.6
CBC Section 2506.2.1 - Other Materials.
Steel Stud Manufacturers Association (SSMA)
Steel Framing Industry Association (SFIA)
Technical Services Information Bureau (TSIB)
Western Wall and Ceiling Contractors Association (WWCCA)

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Submit framing manufacturer's literature, showing tabulation of structural properties, load capacities, dimensions, metal gages and type of coating for all framing and furring members.

B. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of code-compliance certification for studs and tracks.

B. Evaluation Reports: For firestop tracks, post-installed anchors, and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 REGULATORY REQUIREMENTS

- A. Support framing for walls and ceilings shall conform to the 2016 California Building Code (CBC) Title 24 Part 2, Chapter 25 - Gypsum Board and Plaster. Support framing for fire resistive walls, partitions and ceilings shall also conform to CBC Title 24 Part 2 Chapter 7 - Fire-Resistance-Rated Construction, and which are listed in the current UL "Fire Resistance Directory".
- B. Furnish and install wall framing and powder driven fasteners in accordance with the framing and fastener manufacturer's current ICC Evaluation Reports.

1.6 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Stud Manufacturers Association, Certified Steel Stud Association, or the Steel Framing Industry Association.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the project site and store them in adequately ventilated dry locations. If it is necessary to store materials outside, stack them off the ground on a platform and fully protect them from the weather.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 MANUFACTURERS

- A. Acceptable manufacturers or equal:

Angeles Metal Systems
Allied American Studco, Inc.
CEMCO (California Expanded Metal Products Co.)
ClarkDietrich Building Systems
SCAFCO Steel Stud Company.
Steel Construction Systems.
Steel Network, Inc. (The)
Unimast, Inc.
Western Metal Lath Co.

- B. Acceptable Products: Products shall be fabricated in accordance with the SFIA (ICC-ES ESR 2457), and SSMA (ICC ESR-3064P).

2.3 MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Hot-dip Zinc Coated Steel: ASTM A653, designation G60.
- C. Carbon Steel: ASTM A568. Provide framing components with electro-galvanized finish, conforming to ASTM A633, Type RS or shop-applied red-oxide, zinc chromate or other similar primer.
- D. Powder Driven Fasteners: Types and sizes indicated on the structural drawings. Acceptable manufacturers or equal:
 - Hilti Corp.; ICC ER2388
 - ITW/Ramset/Red Head; ICC ER1372
- E. Screws: No. 8 by 3/8 inch cadmium or zinc coated TEKS screws with pan heads.
- F. Concrete inserts, expansion anchors, powder driven fasteners, flange clips, and bolts for attachment of hanger wires to overhead construction shall have a rated capacity equal to that of the hanger wire.
- G. Wire for Hangers and Ties: ASTM A641, Class 1 zinc coating, soft temper.

2.4 FRAMING SYSTEMS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653/A 653M, G60, hot-dip galvanized unless otherwise indicated.
- C. Steel Studs and Tracks: Fabricate framing members in accordance with ASTM C645 from hot dip zinc coated steel.
 - 1. Minimum Base-Metal Thickness: As indicated on Drawings.
 - 2. Depth: As indicated on Drawings.
- D. Slip-Type Head Joints: Where indicated, provide the following:
 - 1. Slotted Top Tracks: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - 1. 16 ga. thick, to ASTM A653/A653M, Grade 50 with a minimum yield point of 50,000 psi.
 - 2. Length: 10'-0".
 - 3. 2-1/2 inch down-standing legs with 1/4 inch wide by 1-1/2 inch high slots spaced at 1 inch on center.
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. CEMCO; California Expanded Metal Products Co.; SLP-TRK Slotted Deflection Track.

- b. ClarkDietrich Building Systems; MaxTrack™ (SLT).
 - c. Sliptrack Systems; SLP-TRK® Slotted Deflection Track.
 - d. Steel Network, Inc. (The): VertiTrack VT.
- E. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CEMCO; California Expanded Metal Products Co.; FAS Track.
 - b. ClarkDietrich Building Systems; BlazeFrame DSLO, MaxTrak, or SLP-TRK Slotted Deflection Track.
 - c. Sliptrack Systems; SLP-TRK Slotted Deflection Track.
 - d. Steel Network, Inc. (The): VertiTrack VT.
- F. Flat Strap and Backing Plates: Galvanized steel, not lighter than 0.0635-inch (16-gage), of proper size to accommodate fastenings.
- G. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch-wide flanges.
 - 1. Depth: 1-1/2 inches
 - 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.

2.5 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- B. Hanger Attachments to Concrete:
 - 1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, AC193, AC58, or AC308 as appropriate for the substrate.
 - a. Uses: Securing hangers to structure.
 - b. Type: Torque-controlled, expansion anchor, torque-controlled, adhesive anchor, or adhesive anchor.
 - c. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 - d. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 or Group 2 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.
 - 2. Power-Actuated Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- D. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch-wide flanges.
 - 1. Depth: 1-1/2 inches.
- E. Furring Channels (Furring Members):

1. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
 - a. Minimum Base-Metal Thickness: 0.0179 inch.
- F. Provide galvanized channels for exterior locations.

2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
 1. Asphalt-Saturated Organic Felt: ASTM D226, Type I (No. 15 asphalt felt), nonperforated.
 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754, except comply with framing sizes and spacing indicated.
 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install slotted tracks in strict accordance with manufacturer's instructions and referenced regulation requirements, to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - a. Secure studs to slotted top track with #8 wafer-head screws. Maintain minimum deflection gap of 0.5 inch between top of stud and top of slotted track. Limit vertical movement to 1 inch, plus or minus 1/2 inch.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 - 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
 - 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated. Set runners in two beads of acoustical sealant or two strips of acoustical tape as specified in Section 07 92 00.
 - 6. Reinforce and stiffen partitions with 3/4-inch (or larger as necessary) steel channels placed horizontally not more than 4'-6" apart. Wire-tie or bolt stiffeners to inside surfaces of studs.
- E. Direct Furring:
 - 1. Screw to wood framing.
 - 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.4 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Hangers: 48 inches o.c.
 2. Carrying Channels (Main Runners): 48 inches o.c.
 3. Furring Channels (Furring Members): 16 inches o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Do not attach hangers to steel roof deck.
 5. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 6. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 7. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers and compression posts used for support, as indicated.
- F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.5 CLEAN-UP AND PROTECTION

- A. Perform clean-up of the premises as specified in Section 01 77 00.

END OF SECTION

06/06/18

SECTION 09 24 00.13

ACRYLIC-MODIFIED PORTLAND CEMENT PLASTERING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes Acrylic-modified Portland Cement Plaster (stucco) and accessories for the following system:
 - 1. Exterior Stucco over wood sheathing on metal framing: Scratch, brown, and finish coat applied over metal lath, over weather resistant barrier, over wood sheathing on metal framing.
- B. Related Sections:
 - 1. Section 05 40 00 – Cold-Formed Metal Framing: Metal stud framing for cement plaster.
 - 2. Section 06 16 00 - Sheathing.
 - 3. Section 07 25 00 - Weather Barriers.
 - 3. Section 07 62 00 - Sheet Metal Flashing and Trim.
 - 4. Section 07 92 00 - Joint Sealants.
 - 5. Section 08 31 16 - Access Panels and Frames: Access panels in plaster work.

1.02 REFERENCES

- A. ASTM International:
 - 1. ASTM A641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 - 2. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 3. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - 4. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
 - 5. ASTM C190 - ASTM C190 Method of Test for Tensile Strength of Hydraulic Cement Mortars.
 - 6. ASTM C348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.
 - 7. ASTM C847 - Standard Specification for Metal Lath.
 - 8. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster.
 - 9. ASTM C933 - Standard Specification for Welded Wire Lath.
 - 10. ASTM C1032 - Standard Specification for Woven Wire Plaster Base.
 - 11. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.
 - 12. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete.
 - 13. ASTM D968 - Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.
 - 14. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 - 15. ASTM E72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
 - 16. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

17. ASTM E514 - Standard Test Method for Water Penetration and Leakage Through Masonry.
 18. ASTM G155 - Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.
- B. California Building Code (CBC), 2016 Edition, Title 24, Part 2, Chapter 7 and Chapter 25.
 - C. Division of State Architect – Interpretation of Regulations:
 1. IR 25-4: Self Furring Lath.
 - D. International Code Council – Evaluation Service Report:
 1. ICC-ES Evaluation Report ESR-2535, BMI 690 Plaster.
 2. ICC-ES Evaluation Report ESR-2017, Structalath No. 17 SFCR II and No. 17 SFCR Twin Trac, Structa Mega Lath, V-Truss Walls and Ceilings, Lath, and Structa-Corners Reinforcements.
 - E. Manufacturer's specifications and recommendations.
 - F. Stucco Manufacturer's Association; www.stuccomfgassoc.com
 - G. Technical Services Information Bureau; www.tsib.org
 1. 2014 Plaster Assemblies Manual.
 - H. Underwriters Laboratories, Inc.
 1. UL (FRD) - Fire Resistance Directory.
 - I. Wall and Ceiling Alliance (WACA); www.wallandceilingalliance.org
 - J. Western Wall and Ceiling Contractors Association; www.wwcca.org

1.03 PRE-INSTALLATION MEETING

- A. Pre-Installation Meeting:
 1. Convene meeting at Project Site within one week of scheduled start of application with representatives of the following in attendance: Owner or Owner's designated representative, Architect, Contractor, sub-contractor and manufacturer's representative.
 2. Review substrate conditions, requirements of related work, installation instructions, storage and handling procedures and protection measures.

1.04 SYSTEM DESCRIPTION

- A. Design Requirements:
 1. Extend complete plaster assembly behind surface installed fixtures and trim.
 2. Water resistive barrier beneath lath at all locations.
- B. Products provided under this section shall exhibit the following characteristics when tested as follows:
 1. ASTM C 109: Compressive Strength: 2020 psi.
 2. ASTM C 348: Flexural Strength: 570 psi.
 3. ASTM C 190: Tensile Strength: 180 psi.
 4. ICC Procedure: Freeze/Thaw cycling: No cracking, checking or delamination
 5. ASTM E 72: Transverse Load Strength: Wood Studs – 96 psf; Metal Studs – 138 psi.
 6. ASTM E 514: Water Vapor Permeability: 7.2 Perms.
 7. ASTM E 119: Fire Resistive Wall Assembly, acceptable as part of One-Hour

- Assembly.
8. MIL STD 810B: Mildew Fungus Resistance – Passed.
 9. ASTM B 117: Salt Spray Resistance – 300 hrs, no deleterious effects.
 10. ASTM D 968: Abrasion Resistance – 132 gal, no deleterious effects.
 11. ASTM D 1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
 12. ASTM G155: Accelerated Weathering – 5000 hrs, Passed.

C. Performance Requirements:

1. Finish surfaces flat, true, and plumb to plus or minus 1/8-inch in 10 feet.
2. Provide weather tight assembly.

1.05 ACTION SUBMITTALS

- A. See Section 01 33 00 – Submittal Procedures, for submittals procedures.
- B. Product Data: For each type of product. Provide data on plaster materials, accessories, characteristics and limitations of products specified. Include mix design for each coat.
- C. Shop Drawings: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.
- D. Samples: Submit two samples, 12 x 12 inch in size illustrating each factory-prepared finish coat and for each color and texture specified. Provide color samples of sealants. Provide physical samples of each type of fastener and anchorage.
- E. Sample Warranty: For manufacturer's special warranties.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C 926.
- B. Regulatory Requirements: Plaster construction shall meet the requirements of the 2016 California Building Code (CBC) Title 24 Part 2, Chapter 25 - Gypsum Board and Plaster:
 1. Section 2507 – Lathing and Plastering.
 2. Section 2510 – Lathing and Furring for Cement Plaster (Stucco).
 3. Section 2512 – Exterior Plaster.
- C. Conform to 2016 California Building Code (CBC) Title 24 Part 2, Chapter 7 – Fire Resistance Requirements for Plaster. Rated Construction for fire rated assemblies as indicated on drawings.
- D. Allowable Tolerances: Finish all plaster surfaces to true and even plane within tolerance of 1/8-inch in 10 feet inch as measured by a straightedge placed at any location on surface.
- E. Manufacturer Qualifications: Company specializing in manufacturing the products of this section with minimum five (5) years of documented experience.
- F. Applicator Qualifications: Installer shall be listed with Acrylic-Modified Portland Cement Plaster Systems Manufacturer as a trained applicator and shall possess a current Manufacturer-trained contractor certificate.

- G. Field mixed plaster systems not permitted.

1.07 MOCK-UP

- A. Section 01 45 00 – Quality Control: Requirements for mockups.
- B. Before proceeding with installation of cement plaster work, prepare a mock-up. The mock-up shall include flashings, cement plaster accessories, reveals, corner bead, casing beads, control joints and complete plaster base coats including proposed finishes.
- C. Provide mock-up with a minimum area of 100 square feet.
 - 1. Install mockups for each type of finish indicated.
 - 2. Locate where directed.
- D. Make such modifications as necessary to achieve a satisfactory mock-up, or remove and construct additional mock-up. Unacceptable work shall be removed.
- E. Retain accepted mock-up as quality standard for acceptance of completed work. Subject to compliance with requirements, approved mockups may become part of the completed work if undisturbed at time of Substantial Completion.
- F. Deviations from the final, approved mock-up are not permitted unless approved by the Architect. The Architect reserves the right to reject any or all deviations from the approved mock-up.

1.08 DELIVERY, STORAGE AND HANDLING

- A. In accordance with the manufacturer's recommendations.
- B. Store materials inside under cover, and keep them dry and protected against damage from weather, moisture, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.
- C. Immediately remove from site all materials which have been delivered in broken, damaged, or unlabeled condition.
- D. Protect materials from dampness.
- E. Store materials indoor, off floor.

1.09 FIELD CONDITIONS

- A. Comply with ASTM C 926 requirements.
- B. Exterior Plasterwork:
 - 1. Application of materials shall not take place during inclement weather unless appropriate protection is provided. Protect materials from inclement weather until they are dry.
 - 2. Protect the materials from uneven and excessive evaporation in warm windy weather. Always work the shady side of the wall.
 - 3. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.

4. Apply plaster when ambient temperature is greater than 40 deg F.
 5. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.
- C. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

1.10 WARRANTY

- A. Section 01 78 36 – Warranties: Requirements for warranties.
- B. Furnish manufacturer's 15-year Single Source Warranty encompassing the work of this Section. Assist the Owner to properly execute the warranty request forms.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Manufacturers:
1. BMI Products; www.bmi-products.com, 990 Ames Avenue, Milpitas, CA 95035-6303, (408) 293-4008; Local Representative: Jerry L. Pozo, CSI, CDT, BS.
 2. Substitutions: Section 01 25 13 – Product Options and Substitutions.
- B. Product Description and Basis of Design: BMI 690 Plaster, ICC-ES Evaluation Report ESR-2535; a premixed scratch and brown coat, a complete ASTM C926 mix, just add water.

2.02 PREMIXED and ENGINEERED PLASTER MATERIALS

- A. Plaster Base Coat: "BMI 690 Plaster": A premium pre-blended cement-lime-sand mixture, with fiber that has been specially formulated for the scratch and brown coat. This pre-blended product assures consistent quality throughout the project. Available in: Sacks, superbags, or environmentally-friendly silo/mixer.
- B. Water: Clean, fresh, potable and free of mineral or organic matter which can affect plaster.
- C. Leveling Coat/Lamina: Apply in thin layer over Portland Cement Plaster Base Coat to embed reinforcing mesh and provide uniform substrate for finish application.
1. BMI 777 high performance, fiber-reinforced, polymer-modified basecoat 1/8" nominal.
- D. Reinforcing Mesh: ASTM C-1116, BMI Standard Reinforcing Mesh: Specially woven, alkali-resistant glass fiber reinforcing mesh, 4.5 oz/ sq. yd. with integral compatibility treatment for related materials.
- E. Primer: 100% BMI acrylic color primer: Water-based, pigmented acrylic primer applied over the cured plaster base coat, minimum 7 days, to improve adhesion and provide more uniform finish appearance.
- F. Finish: 100% acrylic finishes/coatings with integral color and texture. Multiple color(s) as selected by Architect as indicated on exterior elevations:
1. Acceptable manufacturer: BMI Products Inc.
 2. Other equivalent manufacturers accepted under substitution request per

Section 01 25 13 – Product Options and Substitutions.

3. Texture: As selected by Architect from manufacturer's standard textures.
- G. Warranties available with BMI 690 Plaster basecoats:
 1. BMI 100% acrylic finish of 7-10 years.
 2. Single Source Warranty from BMI Products to the Owner for 15 years (basecoats, lamina, primer, acrylic finish).
 3. Other manufacturers of equal quality and single source warranty acceptable under substitution request.

2.03 METAL LATH

- A. Weather-Resistive Barrier: Water resistive barrier as specified in Section 07 25 00.
- B. Separation Layer: Two-ply asphalt saturated kraft Grade D breather type sheathing paper.
 1. Type: Professional: Fortifiber® / Two-Ply Super Jumbo Tex® 60 Minute.
 2. Reference Standard; Federal Specification UU-B-790a, Type 1, Grade D, Style 2.
 3. Moisture Vapor Transmission: 35 grams minimum; ASTM E 96.
 4. Water Resistance: 150 minutes (professional), ASTM D 779.
- C. Flexible Flashing: Waterproofing Barrier beneath exposed horizontal exterior Portland cement covered surfaces. ASTM D 1970 and the following:
 1. Self-adhering, butyl-rubber based water-resistive flashing membrane as specified in Section 07 25 00.
- D. Lath:
 1. Sheathed stud walls: Structa Welded Wire Lath – ASTM C 933.
 - a. Structa Wire Corp; www.structawire.com; Structa Mega Lath:
 - 1) Weight 1.95 lb/yd².
 - 2) Finish – Class 1 Galvanized Coating complying with ASTM A641.
 - 3) Alternate lath to 3.4 lb/yd² diamond mesh metal lath specified in ASTM C847.
 - 4) As per ICC ESR-2017.
- E. Anchorage: Nails, staples, or other metal supports conforming to requirements of referenced standards, of type and size to suit application and conforming to requirements of CBC Table 2507.2 for conditions indicated, galvanized, to rigidly secure lath and associated metal accessories in place.
 1. Screws: Wafer head "lathers" Type S with length that penetrates into wood framing 5/8 inch. Comply with ASTM C1002 and/or ASTM C954.
 2. Nails: Galvanized 11 gage with a 3/8-inch diameter head and a length to penetrate wood framing (exclusive of sheathing) minimum 3/4-inch. Comply with FS FF-N-105.
 3. Staples: Galvanized 16 gauge with a minimum 3/4-inch crown and legs that penetrate wood framing (exclusive of sheathing) minimum 3/4-inch. Comply with FS FF-N-105.

2.04 ACCESSORIES

- A. General: Comply with ASTM C1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required. Galvanized steel, unless otherwise specified.

- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Structa Wire Corp.
 2. CEMCO.
 3. ClarkDietrich Building Systems.
 4. Phillips Manufacturing Co.
- C. Reinforcement:
1. Interior Corners: No. 30.
 2. Exterior Corners: Structa Wire Corp; www.structawire.com; Structa Welded Wire Lath – ASTM C933:
 - a. V Truss Corners – Exterior Corner Reinforcements:
 - 1) Available in Straight, Bullnose, Arch & One Coat profiles.
 - 2) Finish – Class 1 Galvanized Coating complying with ASTM A641.
 - 3) As per ICC ESR-2017.
- D. Screeds and Molds: Per TSIB Plaster Systems Manual, size and profile as indicated on the Drawings and as necessary to suit application.
1. 22 gauge galvanized steel. Hem exposed edges. Furnish in longest possible lengths.
 2. Furnish drip screeds with weep holes every 2-inches.
 3. #7 Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 (Z180) zinc coating.
 4. J-Series Casing Bead: Cemco Water Management Products, J-Series Casing Bead.
 - a. Manufactured non-perforated to enable the casing bead to have solid flashing capabilities.
 - b. Fabricated from minimum 0.018-inch thick hot-dipped galvanized steel complying with ASTM A653 having a minimum G90 coating complying with ASTM A925.
 5. #3 Flashing Screed: Cemco Water Management Products, #3 Flashing Screed.
 - a. #3 Flashing Screed consists of a combined single piece 45 degree weep screed, for drainage, and a Z flashing for window head protection. Available with or without weep holes.
 - b. Fabricated from minimum 0.018-inch thick hot-dipped galvanized steel complying with ASTM A653 having a minimum G90 coating complying with ASTM A925.
 6. #6 Drip Head: Cemco Water Management Products, #6 Drip Head.
 - a. For application above windows, doors, and louvers on exterior plaster walls. The 45 degree slope allows water to weep out of the assembly, and the 90 degree return provides a 3/4-inch solid metal leg for sealant application from stucco assembly to dissimilar metals.
 - b. Fabricated from minimum 0.018-inch thick hot-dipped galvanized steel complying with ASTM A653 having a minimum G90 coating complying with ASTM A925.
 7. #12 Soffit Drip Edge: Cemco Water Management Products, #12 Soffit Drip Edge.
 - a. Manufactured for soffit and recessed window head application.
 - b. The 45 degree slope allows water to weep out of the assembly. The drip edge provides a place for water to drip from rather than travel back along the edge.
 - c. Fabricated from minimum 0.018-inch thick hot-dipped galvanized steel complying with ASTM A653 having a minimum G90 coating complying with ASTM A925.
 8. #17 Base Flashing: Cemco Water Management Products, #17 Base Flashing.

- a. Manufactured for application at base of stucco assembly to dissimilar materials.
 - b. The 45 degree slope combined with weep holes allows water to weep out of the assembly and the counter flashing leg provides protection to dissimilar materials.
 - c. Fabricated from minimum 0.018-inch thick premium hot-dipped galvanized steel complying with ASTM A653 having a minimum G90 coating complying with ASTM A925.
- E. Expansion and Control Joints:
 - 1. Vertical Joints:
 - a. Control Joints: Keene #C-J Series. Size and location as noted on Drawings.
 - b. Expansion Joints: No. 40; Size and location as noted on Drawings.
 - 2. Horizontal Control Joints: Cemco Water Management Products, No. 15 Solid Leg Control Joint; Size and location as noted on Drawings.
 - a. 5-1/2" x 3/4" horizontal control joint has a 3" long upper solid flange that allows for water to weep out of the stucco cavity and a 1.5" long lower expanded metal flange that allows proper keying of plaster.
 - b. Fabricated from minimum 0.018-inch thick hot-dipped galvanized steel complying with ASTM A653 having a minimum G90 coating complying with ASTM A924.
 - 3. M-Slide Expansion Joint: Cemco Water Management Products, M-Slide Expansion Joint.
 - a. Self-aligning two-piece design allows for 1-inch vertical movement while maintaining a watertight assembly for plaster walls.
 - b. Fabricated from minimum 0.018-inch thick hot-dipped galvanized steel complying with ASTM A653 having a minimum G90 coating complying with ASTM A925.

B. Stucco Reglet and Counterflashing Assembly: As specified in Section 07 62 00.

2.06 SEALANT

- A. "Spectrum 3" or "Spectrum 4" low-modulus silicon sealant, as manufactured by Tremco, Inc., type as recommended by wall finish manufacturer for conditions indicated, and as required to maintain single-source warranty continuity.
 - 1. Color: As selected by Architect from manufacturer's standards.

2.07 PLASTER MIXES

- A. Plaster Base Coat: "BMI 690 Base": A premium pre-blended cement-lime-sand mixture, with fiber that has been specially formulated for the scratch and brown coat. This pre-blended product assures consistent quality throughout the project. The pre-blended product can be mixed in a continuous mixer as well as a mechanical plaster mixer, or environmentally-friendly silo.
- B. Mix for three minutes, but never more than five minutes. DO NOT OVERMIX.
- C. Alternative method of application is the double-back method and is acceptable.
- D. Protect mixtures from freezing, frost, contamination, and excessive evaporation.
- E. Do not re-temper mixes after initial set has occurred.
- F. For Type I, II, III, IV, and V-A construction, (non-combustible walls), BMI 690 Plaster has been independently tested and complies with ASTM E136 non-combustible

construction. BMI 690 Plaster will not aid combustion or add appreciable heat to an ambient fire, and thereby complies with requirements for non-combustible construction. The matter of application in a conventional scratch and brown coat, double-back, or single pass method on the walls; is a moot issue.

- G. Factory-Prepared Finish-Coat Mixes: "BMI Acrylic Finish", texture as selected by Architect, pre-blended using ingredients meeting ASTM requirements. For acrylic-based finish coatings, comply with manufacturer's written instructions.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Mechanical and Electrical: Verify services within walls have been tested and accepted.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.
- B. Prepare smooth, solid substrates for plaster according to ASTM C 926.

3.03 INSTALLATION, GENERAL

- A. General: Install in accordance with all Reference Standards.
- B. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.
- C. Acoustical Sealant: Where required, seal joints between edges of plasterwork and abutting construction with acoustical sealant.
- D. Extend complete plaster assembly behind surface installed fixtures and trim.

3.04 INSTALLING WATER RESISTIVE BARRIER AND FLASHINGS.

- A. Install in accordance with referenced standards. Fasten securely in place.
- B. Water Resistive Barrier and Flashings:
 - 1. Cover surfaces of wall framing under exterior plaster with water resistive barrier, without holes, tears, or gaps. Apply water resistive barrier as a separate layer. Secure end laps at supports.
 - 2. Install water resistive barrier continuously behind applied accessories.
 - 3. Lap horizontal edges 4-inches minimum, shingle fashion to weather.
 - 4. Lap vertical edges 6-inches minimum and seal with tape.

5. Double bottom layer at corners, extending 6-inches around corner from each side.
 6. Lap sheet metal flashings. Lap felt flashing strips at door frames and windows; lap over head and jamb strips and under sill strip.
 7. Extend no part of metal lath under water resistive barrier or flashing. Weather all laps to exterior.
- C. Separation Layer:
1. Apply membrane in accordance with manufacturer's recommendations, laid smooth without folds or bunches of material.
 - a. Seam Overlap: As recommended by membrane manufacturer for specific membrane material and application indicated.
 - b. Sealing: Seal edges and items projecting through vapor retarders and vapor barriers.
 2. Inspect and repair membrane prior to application of finish material over membrane; tape tears, perforations and similar damage.
- D. Flexible Flashing: Install in locations indicated and underlying horizontal and sloped areas of plaster, in inset wall opening sills and similar locations; in accordance with the manufacturer's recommendations and as follows;
1. Substrate Preparation:
 - a. Smooth, clean, dry and free of voids, spalled areas, loose substrate, loose nails, sharp protrusions or other matter that will hinder the adhesion or regularity of installation.
 - b. Clean loose dust or dirt by wiping with a clean dry cloth or brush. Prime the substrate with compatible primer in conditions recommended by flashing manufacturer.
 2. Flashing Application:
 - a. Coordinate installation with other water resistive barrier and metal flashings, interleave as required to weather all laps to drain, directing water to exterior.
 - b. Peel release paper from roll to expose rubberized asphalt and position flashing to center over joint location before application. Ensure flashing is centered over joint opening. Avoid fishmouths.
 - c. Press flashing firmly into place, ensure continuous and intimate contact with the substrate. Cut out wrinkles or other affected areas and replace.
 - d. Flashing shall be continuously supported by the substrate without spanning or bridging joints, gaps or voids in excess of 1/4 inch. Minimum End Laps 2 inch.
 3. Install metal lath over flexible flashing.

3.05 INSTALLING ACCESSORIES

- A. General: Install according to ASTM C1063 and at locations indicated on Drawings.
- B. Set straight, plumb and level, and shim as required to proper grounds. Coordinate, trim or cope screeds and accessories to lap, or be lapped with flashings and work provided by other sections. Ensure all laps of accessories and flashings weather to exterior.
- C. Neatly miter or cope, corners and intersections of accessories to fit exposed edges. Make tight hairline joints.
- D. Lap and caulk drip screeds and other exterior accessories at joints and intersections.
- E. Continuously reinforce angles and fasten only at perimeter edges.

- F. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.
- G. Control Joints: Install control joints at locations indicated on Drawings.
 - 1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
 - a. Vertical Surfaces: 144 sq. ft.
 - b. Horizontal and other Nonvertical Surfaces: 100 sq. ft.
 - 2. At distances between control joints of not greater than 18 feet on center.
 - 3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
 - 4. Where control joints occur in surface of construction directly behind plaster.
 - 5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.
 - 6. Wire tie control joints to the lath, and do not screw down with the same fasteners used for the lath.
- H. Extend screeds and accessories into niches and recesses, around interior and exterior wall corners, and around all sides of columns and similar building elements. Continue control joint patterns and molding alignments on walls of arcades, passages and all similar locations to match or extend those shown on exterior elevations, whether or not individual conditions are specifically shown, noted or elevated.
- I. Lap and caulk cement plaster screeds and other accessories at all joints, comers and intersections to make weathertight.

3.06 INSTALLING METAL LATH

- A. Installation of Structa Mega Lath:
 - 1. Install as per ESR 2017.
 - 2. Fastener type and spacing as per ASTM C 1063 except that fasteners may attach to the lath to framing supports either at the furring crimps on the vertical cross wire, at the intersection of the longitudinal wire and cross wire, or any point along longitudinal wire.
 - 3. Mega Lath is designed for nail or screw or staple fastening points to coincide with the longitudinal Twin Trac wires.
 - 4. Lath shall not be continuous through control joints, but shall be stopped and tied at each side as required by ASTM C1063.
 - 5. For alternative installations for 1.4 lb/yd² woven wire or to 3.4 lb/yd² diamond mesh metal lath the maximum spacing must be in accordance with Table 3 of ASTM C 1063.
 - 6. Mega Lath is approved for 24" on center and is to be lapped one mesh.
 - 7. Refer to current manufacturer's instructions posted @ <http://www.structawire.com>
- B. Reinforce internal and external corners with lath:
 - 1. Continuously reinforce internal angles with corner mesh, return metal lath 3-inches from corner to form the angle reinforcement; Fasten only at perimeter edges.
- C. Apply strip reinforcement diagonally at corners of lathed openings. Secure rigidly in place.
- D. Place 4-inch wide strips of metal lath centered over junctions of dissimilar backing materials. Secure rigidly in place.

3.07 PLASTER APPLICATION

- A. General: Comply with ASTM C 926. Apply BMI 690 premixed plaster in accordance with manufacturer's written instructions.
1. Do not deviate more than plus or minus 1/4 inch in 10 feet from a true plane in finished plaster surfaces when measured by a 10-foot straightedge placed on surface.
 2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
 3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.
- B. Three-Coat Application over Metal Lath:
1. Apply first coat to a nominal thickness of 3/8 inch. Apply plaster scratch coat to embed lath completely so that no lath is visible. Scratch or score vertical surfaces horizontally at even intervals for mechanical key.
 2. Apply second coat to a nominal thickness of 3/8 inch once the first coat is sufficiently rigid to accept the application without being disturbed. Apply evenly, using a rod, darby or other straightedge, bring surface to a true, even plane, flush with plaster grounds.
 3. Float surface with a wood or hard rubber float to promote densification and ensure a surface with adequate "tooth" receptive to bonding of the finish coat.
 4. Apply acrylic primer and finish coat to a nominal thickness of 1/8 inch. Apply evenly over brown coat and 7 days after application of preceding coat.
- C. Curing: Base requires adequate moisture to allow continuous hydration of the cement.
1. Minimum two (2) days of moist curing shall be provided.
 2. Provide additional moist curing to conform to code requirements, manufacturer recommendations, local practices and climatic conditions and as otherwise required to provide acceptable substrate for finish coat.
 3. Base coat shall be allowed to cure for a minimum of 7 days prior to coating with acrylic primer and Finish.
- D. Reinforced Leveling Coat:
1. Ensure that the surface of the wall is cured, clean, dry and free of efflorescence, oil or other contaminants that would impair adhesion.
 2. Apply mixture in continuous layer approximately 3/32 inch thick.
 3. Apply a layer of reinforcing mesh into the wet mixture and trowel smooth until mesh is fully embedded. Lap adjoining pieces of mesh 2-1/2 inches minimum and as described in the manufacturer's written instructions and technical bulletins.
 4. Cure for a minimum of 24 hours, until dry, or longer as required by weather conditions.
- E. Primer Application: Colored Primer;
1. Ensure that the surface of the wall is cured, clean, dry and free of efflorescence, oil or other contaminants that would impair adhesion.
 2. Primer color shall closely match that of the selected finish.
 3. Stir to a smooth homogeneous consistency and apply to the wall using a roller, brush or airless spray equipment. Refer to published Colored Primer data sheet for more complete instructions.
 4. Allow to completely dry.
- F. 100% Acrylic Textured Finish Application:

1. Ensure that the surface of the wall is clean, dry and free of any contaminants that may impair the adhesion of surface finish.
2. Spray, or trowel-apply textured finish to dried primer.
3. Apply finish to natural breaks to avoid visible cold joints.
4. Always work the shady side of the wall or provide temporary shading to avoid application in direct sunlight.
5. Apply in accordance with manufacturer directions for the specific finish and texture being used.

3.08 FIELD QUALITY CONTROL

- A. Maximum Variation from True Flatness: 1/4 inch in 10 feet. No "eye-catching" discrepancies shall be allowed. Refer to TSIB Technical Bulletin 60-100 "Procedures for Judging Finished Portland Cement Plaster".
- B. Avoid performing work that will result in patching.
- C. In the event of a dispute over quality or an installation, the Architect shall call on the TSIB. Contractor agrees to abide by TSIB decision for repair, alteration, or remedy.

3.09 PLASTER REPAIRS - PATCHING OF FIRST AND SECOND COATS

- A. General: Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.
- B. Cut out, remove, and repair cracks and spalled cement plaster surfaces as specified herein. This work shall include all 1/32-inch and wider cracks.
 1. Removal of existing plaster:
 - a. Carefully remove soft, broken, or loose plaster back to lath and to solid adjacent plaster. The edges shall be straight, clean, sharp, and beveled inward to permit keying repairs into existing cement plaster.
 - b. Remove unsound plaster. If base coat is sound remove only finish coats.
 - c. Open small cracks slightly using a knife or chisel to remove the existing cement plaster. Enlarge large cracks with a saw. Make sawcuts perpendicular to the surface. Do not further enlarge large cracks except as required to remove soft, broken, or loose materials, and as may be required to correct defective substrates.
 - d. Remove plaster coats in step fashion so that each new coat will overlap the underlying existing plaster coat.
 - e. For cracks less than 1/8-inch wide into which a thin knife blade can be inserted, remove loose material as described herein and patch using 1 part portland cement to 2-1/2 parts fine (100 percent passing a 30 mesh screen) silica sand aggregate with an admixture added. Build patches up in layers using a stiff mix. Finish off flush with surrounding surface and match adjacent texture.
 2. Remove all traces of dirt, oil, grease, and other foreign matter before installing new lath and plaster.
 3. Apply bonding agent in accordance with manufacturer's directions and as recommended in the Portland Cement Association's publication "Bonding Concrete or Plaster to Concrete".
 4. Install new cement plaster as specified herein. Wetting of adjacent existing plaster surfaces is required prior to installing new portland cement plaster. Build up new portland cement plaster patches in coats. Apply each coat

about 1/4- inch thick and allow to cure properly before applying succeeding coat.

5. The total thickness of the portland cement plaster patch shall match that of the existing adjacent finish.

3.10 CLEANING

- A. Section 01 77 00 – Contract Closeout and Final Cleaning: Requirements for cleaning.
- B. Clean installed surfaces in accordance with manufacturer's instructions; do not clean surfaces with products not specified in manufacturer's instructions. Clean as work progresses, remove residue without delay.
- C. Protect metal surfaces and plumbing fixtures. Flush surfaces with clean water before and after cleaning.

3.11 PROTECTION

- A. Protect finished work from damage until acceptance by Owner.
- B. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION

06/06/18

SECTION 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Interior gypsum board and accessories.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Sections:
 - 1. Section 09 22 16 "Non-Structural Metal Framing" for metal stud framing and furring.
 - 2. Section 07 52 00 "Modified Bituminous Membrane Roofing" for glass-mat, water-resistant gypsum substrate roof boards.
 - 5. Section 09 91 00 "Painting" for coordination of gypsum board finish levels with specified paint systems.

1.2 REFERENCES

- A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference: Refer to Section 01 42 19 for information concerning availability and use of references.

ASTM International (ASTM)
Gypsum Association (GA)
Technical Services Information Bureau (TSIB); formerly Western Lath/ Plaster/
Drywall/ Industries Association (WLPDIA)
Western Wall and Ceiling Contractors Association (WWCCA)

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Certificates: Submit manufacturer's certification that products meet or exceed requirements of the referenced specifications.
- C. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 QUALITY ASSURANCE

- A. Gypsum Board Construction: Meet the requirements of the 2016 California Building Code (CBC) Title 24 Part 2, Chapter 25 - Gypsum Board and Plaster.
- B. Regulatory Requirements: The quantity of volatile organic compounds (VOC) used in adhesives and sealants shall not exceed the limits permitted under the current regulations for architectural coatings of the Bay Area Air Quality Management District, and South Coast Air Quality Management District.

- C. Field Samples: On actual gypsum board surfaces, prepare field samples of at least 100 square feet in surface area for the applications listed below. Simulate finished lighting conditions for review of in-place unit of work.
 - 1. Wall surfaces indicated or specified for non-textured finish.
 - 2. Ceiling surfaces indicated or specified for non-textured finish.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver gypsum board and accessories in the manufacturer's original unopened containers, bundles or rolls bearing the manufacturer's name and brand designation.
- B. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.
- C. Store flammable adhesives away from fire, sparks and smoking areas.
- D. Handle gypsum board to prevent damage to edges, ends, and surfaces.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not apply gypsum board until insulation, pipes, conduits, ducts, vents, supports and other items that will be concealed by the gypsum board have been inspected, tested and approved by the governing authorities and unsatisfactory conditions have been corrected.
- C. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- D. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistive Construction: Meet the requirements of CBC Title 24 Part 2 Chapter 7 - Fire and Smoke Protection Features and Chapter 8 - Interior Finishes.
 - 1. Fire-Resistance-Rated Assemblies: Provide fire-resistance rated assemblies identical to those in Chapter 7 of the CBC Title 24 Part 2 or in listing of other testing agencies acceptable to the State Fire Marshal.
 - 2. Fire Performance Characteristics: Provide finish materials meeting requirements of Chapter 8 Section 803 of the CBC Title 24 Part 2 and that have been tested and bear the UL label and marking, or marking of other testing agency acceptable to the State

Fire Marshal, indicating the following fire performance characteristics tested in accordance with ASTM E84.

- a. Flame Spread: Not more than 25.
- b. Smoke Developed: Not more than 50.

- B. Fire Resistive Gypsum Board: Bear the Underwriter's Laboratories Inc. (UL) label or label of another organization acceptable to the State Fire Marshal.
- C. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide in maximum 4 foot widths and maximum lengths available that will minimize joints in each area and that correspond with support system indicated.

2.3 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

Georgia-Pacific Gypsum LLC; www.gp.com
Continental Building Products, LLC.; www.continental-bp.com
National Gypsum Company; Gold Bond Building Products Division;
www.nationalgypsum.com
USG Corporation; www.usg.com
PABCO Gypsum; www.pabco gypsum.com
CertainTeed Corp; www.certainteed.com

2.4 INTERIOR GYPSUM BOARD

- A. Gypsum Board, Type X: ASTM C1396: 5/8 in. thick unless otherwise shown or specified, with tapered edges and either rounded or beveled returns for prefilling. Where fire resistive ratings are shown use thickness required to comply with assembly fire testing of gypsum board partitions for fire rating required.

1. Acceptable products:

- a. USG Corporation Sheetrock Brand EcoSmart Firecode X panels; or equal.
 - 1) As compared to the net use of fresh water value of 1.329 m³/1000 ft² in the Gypsum Association Industry Standard Type III EPD for North American Type X wallboard, wallboard uses a manufacturing process with a 25% or greater reduction in net use of fresh water value or a net use of fresh water value less than or equal to 1.0 m³/1000 ft² for wallboard manufactured west of the Mississippi River as listed in a product specific Type III EPD for North American Type X wallboard.
 - 2) As compared to the global warming potential value of 317.4 kg CO₂-eq./1000 ft² in the Gypsum Association Industry Standard Type III EPD for North American Type X wallboard, wallboard uses a manufacturing process with a 21% or greater reduction in global warming potential or a global warming potential value of less than or equal to 232 kg CO₂-

eq./1000 ft² for wallboard manufactured west of the Mississippi River as listed in a product specific Type III EPD for North American Type X wallboard.

- 3) As compared to the primary energy from non-renewable resources value of 5,291 MJ/1000ft² in the Gypsum Association Industry Standard Type III EPD for North American Type X wallboard, wallboard uses a manufacturing process with a primary energy from non-renewable resources value less than or equal to 3,986 MJ/1000 ft² for wallboard manufactured west of the Mississippi River as listed in a product specific Type III EPD for North American Type X wallboard.

- b. G-P Gypsum Corp.; or equal.
- c. National Gypsum Company; or equal.
- d. CertainTeed Gypsum; or equal.

B. Moisture- and Mold-Resistant Gypsum Board: ASTM C1396, 5/8 in. thick "Type X" unless otherwise shown or specified, with tapered edges and either rounded or beveled returns for prefilling. Where fire resistive ratings are shown use thickness required to comply with assembly fire testing of gypsum board partitions for fire rating required.

1. Acceptable products:

- a. United States Gypsum Co.; Sheetrock Brand EcoSmart Mold Tough Firecode X Panels, or equal.
 - 1) Wallboard uses a manufacturing process with a net use of fresh water value less than or equal to 1.35 m³/1000 ft² for wallboard manufactured west of the Mississippi River as listed per Product Category Rules for North American Gypsum Boards.
 - 2) Wallboard uses a manufacturing process with a global warming potential value of less than or equal to 268 kg CO₂-eq./1000 ft² for wallboard manufactured west of the Mississippi River as listed per Product Category Rules for North American Gypsum Boards.
- b. CertainTeed Gypsum; M2Tech® gypsum board, or equal.
- c. G-P Gypsum Corp.; Mold-Guard Gypsum Board, or equal.
- d. National Gypsum Company; Gold Bond Brand XP Fire-Shield Gypsum Board, or equal.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.

1. Material: Paper-faced galvanized-steel sheet.
2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. Expansion (control) joint.

2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping or drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping or drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping or drying-type, all-purpose compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound; drying-type, all-purpose compound; or high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

2.7 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 - 1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Acceptable products or equal:
 - a. OSI® F38 Drywall and Panel Adhesive; www.ositough.com
 - b. Liquid Nails DWP Drywall Construction Adhesive; www.liquidnails.com
 - c. Franklin International; Titebond Professional Drywall Adhesive; www.titebond.com
- C. Screws: Conform to the standards specified below for attaching gypsum board to the various substrates listed.
 - 1. Steel Drill Screws for Metal Framing, 20-Gage and Heavier: ASTM C954.
 - 2. Steel Drill Screws for Metal Framing and Furring, 25-Gage: ASTM C1002, Type S.
 - 3. Wood Framing: ASTM C1002, Type W.
 - 4. Gypsum Backing Board: ASTM C1002, Type G.
- D. Nails for Attaching Gypsum Board to Wood Framing: ASTM C514.

- E. Resilient Channels: As specified in Section 09 22 16.
- F. Acoustical Sealant: As specified in Section 07 92 00.
- G. Sound Attenuation Blankets: As specified in Section 07 21 00 "Thermal Insulation".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine framing to ensure that corners and framing are plumb, true and solid and that framing members are properly spaced. Edges and ends of board shall have solid bearing.
- C. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. General: Comply with ASTM C840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Use fire retardant, moisture- and mold-resistant gypsum board on walls within toilet rooms, and elsewhere as indicated.
 - 2. Use fire retardant backing board or fire retardant gypsum board for base layer for 2 layer applications.
 - 3. Use proprietary, special fire-resistive gypsum board where indicated or required to achieve specific fire-resistance-rated assembly.
 - 4. Use fire retardant gypsum board in all locations not otherwise indicated or specified.
- B. Nonrated Single Layer Construction:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible, and at right angles to framing unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
 - 3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 - 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
 - 5. Attach gypsum board with screws spaced 8 inches on center for edge spacing at ceilings, 7 inches on center for edge spacing at walls, and 12 inches on center for field spacing for walls and ceilings. Use 1-inch long screws for metal framing and furring and 1-1/4 inch long screws for wood framing.
- C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
 2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
 4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- D. Rated Fire Resistive Partitions: Install and fasten gypsum board in accordance with 2016 CBC Title 24 Part 2 Table 721.1(2).
- E. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints at locations indicated on the drawings. If no control joints are indicated, provide joints according to ACTM C 840 to ensure that unbroken wall surfaces are limited to 30-feet in length and unbroken ceiling surfaces are limited to 2500 square feet or 50-feet in either direction.
- C. Interior Trim: Install in the following locations:
1. Cornerbead: Use where indicated at vertical and horizontal outside corners and angles.
 2. LC-Bead: Use at exposed panel edges.
 3. L-Bead: Use where indicated.
 4. U-Bead: Use at exposed panel edges where indicated.

3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Tape and finish joints, corners, fastener heads, and other imperfections in accordance with the manufacturer's specifications and recommendations to provide a smooth finish.

- E. Reinforce joints, wall and ceiling angles, and inside vertical corners with tape embedded in joint compound. Finish joints with not less than 2 applications of joint compound, allowing each application to dry thoroughly and sanding between coats as required.
- F. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840.
 - 1. Level 1: Provide for ceiling plenum areas and concealed areas, and surfaces receiving fabric-covered tackboard paneling, unless a higher level of finish is required for fire-resistive-rated assemblies and sound-rated assemblies. Where Level 1 gypsum board finish is indicated or specified, apply embedding coat of joint compound. Remove excess joint compound.
 - 2. Level 2: Provide for gypsum board substrates for FRP paneling and other panel application. Where Level 2 gypsum board finish is indicated or specified, apply embedding coat of joint compound for first coat and an additional coat of joint compound over all joints angles, fastener heads and accessories. Remove excess joint compound.
 - 3. Level 3: Not used.
 - 4. Level 4: Provide for gypsum board surfaces that will be exposed to view unless otherwise indicated. Where Level 4 gypsum board finish is indicated or specified, embed tape in finishing compound plus 2 separate coats applied over joints, inside angles, fastener heads, and accessories using ready-mixed, drying type, all-purpose taping compound. Feather out third coat approximately 6-inches from center of joint. After drying, sand or otherwise treat each coat and after last coat of the compound to provide a smooth even surface.
 - 5. Level 5: Provide for gypsum board surfaces indicated to receive non-textured finish and semi-gloss enamels. Where Level 5 gypsum board finish is indicated or specified, embed tape in finishing compound plus 2 separate coats applied over joints, inside angles, fastener heads, and accessories using ready-mixed, drying type, all-purpose taping compound, plus a thin skim coat of joint compound over the entire gypsum board surface. After drying, lightly sand or otherwise treat the surface of the compound to provide a smooth even surface free of porosity or other surface variations.
- G. Treat external corners, edges, and ends with metal beads and edge trim. Finish with 3 coats of joint compound and feather out between 8-inches and 10-inches from the nose.
- H. The final application of compound and sanding shall leave all gypsum board surfaces uniformly smooth and in condition to receive specified finish.

3.6 REPAIR, CLEAN-UP AND PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.
- D. Repair fastener pops by driving a new fastener approximately 1-1/2 inches from the fastener pop and reset the popped fastener. When face paper is punctured, drive a new fastener approximately 1-1/2 inches from the defective fastener. Fill damaged surfaces with compound.
- E. Upon completion of the work, remove from adjacent surfaces, overspray, splatter and daubs of taping and finish compound and textured finishes. Remove tools, equipment, unused material and cuttings and leave the work in a clean orderly manner.

END OF SECTION

06/06/18

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for interior ceilings.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES

- A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference: Refer to Section 01 42 19 for information concerning availability and use of references.

ASTM International (ASTM)
Acoustical Insulation Manufacturer's Association (AIMA)
Ceilings & Interior Systems Construction Association (CISCA)
DSA Interpretation of Regulations IR 25-2.13
General Services Administration Federal Specifications (Fed. Spec.)

1.3 ACTION SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's catalog cuts, specifications, and other data for each component of the acoustical ceiling systems as necessary to demonstrate compliance with these specifications.
- B. Samples: Submit the following samples for review:
 - 1. 12-inch long samples of main tees, cross tees and perimeter molding.
 - 2. 6" by 6" samples of each type of acoustical units to be used in the work.
- C. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For each acoustical panel ceiling suspension system, from ICC-ES.

1.5 CLOSOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Panels: Full-size units equal to 2 percent of quantity installed.
 - 2. Suspension-System Components: Quantity of each exposed and concealed component equal to 2 percent of quantity installed.
 - 3. Hold-Down Clips: Equal to 2 percent of quantity installed.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver acoustical units, suspension-system components, and accessories to Project site in original, unopened packages bearing the manufacturer's name, brand designation, and label verifying compliance with these specifications. Store materials in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Immediately before installation, store acoustical units for not less than 24 hours at the same temperature and relative humidity as the space where they will be installed.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Maintain a uniform temperature of not less than 60 degrees F nor more than 85 degrees F and a relative humidity of not more than 70 percent continuously from 24 hours before installation until 24 hours after completion of work.

1.9 SCHEDULING

- A. Wet operations such as plastering, concrete and masonry work shall be completed and dry before installation of acoustical ceilings. Mechanical, electrical and other work above the ceiling line shall be completed and approved before start of acoustical ceiling installation.

1.10 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace acoustical panel ceilings that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance Requirements: Furnish and install suspension systems in accordance with the suspension system manufacturer's current ICC Evaluation Services Report and 2016 California Building Code (CBC), Title 24 Part 2, Sec. 1607A.1; CBC Title 24 Part 2, Chapter 25 and Interpretation of Regulations IR 25-2.13 issued by the Division of the State Architect (DSA).
- B. Surface Burning Characteristics: Provide finish materials meeting requirements of Chapter 8 Section 803 of the 2016 CBC Title 24 Part 2 and that have been tested and bear the UL label and marking, or marking of other testing agency acceptable to the State Fire Marshal,

indicating the following fire performance characteristics tested in accordance with ASTM E84.

- a. Flame Spread Index: Not more than 25.
- b. Smoke Developed Index: Not more than 50.

2.2 ACOUSTICAL PANELS

A. General:

1. Low-Emitting Materials: Acoustical ceilings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
2. Acoustical Materials: ASTM E1264, with features as specified below. Furnish each type specified from one manufacturer, with the color and texture identical throughout.
 - a. Acoustical materials shall contain a minimum of 30 percent of recycled materials.

B. Basis-of-Design Product: Subject to compliance with requirements, provide stone wool panels, "Rockfon Alaska®" by Rockfon®, or comparable product by one of the following:

1. Armstrong World Industries, Inc.
2. CertainTeed Corporation.
3. United States Gypsum Company.
4. Substitutions: Section 01 25 13 – Product Options and Substitutions.

C. Stone wool panels, "Rockfon Alaska®" by Rockfon® with the following characteristics:

1. ASTM E1264 Classification: Type XX, Pattern G.
2. Finish: Factory painted glass scrim surface.
3. Edges: Square.
4. Size: 24" x 24" and 24" x 48"
5. Thickness: 3/4".
6. NRC: 0.90.
7. CAC: 22.
8. AC: 180.
9. Fire Class: Class A.
10. Fire Performance:
 - a. UL 723 (ASTM E84) Flame Spread Index: 0.
 - b. UL 723 (ASTM E84) Smoke Developed Index: 5.
11. Light Reflectance: 0.86.
12. Recycled Content: Up to 39%.
13. R Value (BTU Units): 2.6 to 3.1.

2.3 METAL SUSPENSION SYSTEM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or equal:

1. Chicago Metallic, Heavy Duty Non-Fire Rated Double Web Suspension System manufactured by Rockfon; 200 main runners; 1200 series cross runners.
2. Armstrong; Prelude XL HD 7301 main runners and cross runners.
3. USG Interiors; DX26 main runners; DXO-216 cross runners.

- B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M and ASTM E580 Section 5.1, and designated by type, structural classification, and finish indicated.
- C. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 15/16-inch wide metal caps on flanges.
 - 1. Structural Classification: Heavy-duty system.
 - 2. End Condition of Cross Runners: Butt-edge type.
 - 3. Face Design: Flat, flush.
 - 4. Cap Material: Cold-rolled steel.
 - 5. Cap Finish: Painted white.
 - 6. Main Runners and Cross Tees: Double web type of cold rolled steel with protective coating and with painted steel caps. Width of exposed faces shall be 15/16-inch.
 - 7. Intersections and Connections: Provide intersections and connections capable of withstanding a mean ultimate test load of not less than 180 pounds in compression and tension, per ASTM E580 Section 5.1.2.
 - 8. Finish: Finish all exposed metal parts with a baked-on vinyl finish, matte white color.

2.4 ACCESSORIES

- A. Hanger Wires: Class 1 zinc coated (galvanized) carbon steel conforming to ASTM A641. Wire shall be #12 gage (0.106" diameter) with soft temper and minimum tensile strength = 70 ksi. The maximum allowable (ASD) tension load for wire meeting this specification is 350 pounds.
- B. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- C. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
- D. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in place.
- E. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.
- F. Main Beam Splice Clip: Manufacturer's standard splice clip to reinforce main beam carrier where it is cut to make transition at top and bottom of sloped ceilings.

2.5 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
 - 1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.
- B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION OF CEILING SYSTEMS

- A. Comply with ASTM C636, Section 5.2 of ASTM E580, and manufacturer's written instructions.
- B. Place units as indicated on the drawings. Install with joints true and straight and junctures with ceilings, walls and openings neat and tight. Completed work shall present a smooth plane and level surface, free from unevenness, edge or corner offsets, cupping, scratches and other imperfections.
- C. Perform all cutting required for fixtures, pipes and other work passing through acoustical tile and panels. Neatly and tightly fit units to such work and adjoining work. Fit border units neatly and tightly against abutting surfaces. Replace loose and damaged tiles and panels when directed. Touch-up all damaged finishes. Leave all surfaces clean and free from marking and other disfigurement.
- D. #12 gage hanger wires may be used for up to and including a 4 foot by 4 foot grid spacing and shall be attached to main runners. Splices in hanger wires shall develop 50 percent of the wire allowable load.
- E. Hanger Wires: Space hanger wires as specified for each type of suspension system. Provide each hanger wire in one piece without splices.
 - 1. Anchor each wire to the structure above by one of the means detailed in CBC Sec. 25 and DSA IR 25-2.13. Bend hanger wires directly across the bulb of the main runner and tight against the connection device at supporting construction, then wrap the wire around itself in 3 tight wraps within 1-1/2 inches.
 - 2. Provide #12-gage hanger wires at the ends of all main and cross runners within 8 inches from the support or within 1/4 of the length of the end tee, whichever is least, for the perimeter of the ceiling area. Perimeter wires are not required when the length of the end tee is 8 inches or less.
 - 3. Provide trapeze or other supplementary support members at obstructions to maintain hanger spacing. Provide additional hangers, struts or braces as required at all ceiling

breaks, soffits or discontinuous areas. Hanger wires that are more than 1 in 6 out of plumb shall have counter-sloping wires.

4. Ceiling grid members shall be attached to 2 adjacent walls per ASTM E580, Section 5.2.3. Ceiling grid members shall be at least 3/4-inch clear of other walls. If walls run diagonally to ceiling grid system runners, one end of main and cross runners shall be free, with a minimum of 3/4-inch clear at wall.
 5. The width of the perimeter supporting closure angle shall be not less than two inches. Use of perimeter angles with smaller widths in conjunction with proprietary perimeter clips may be acceptable in accordance with Section 5 of DSA IR 25-2.13.
 6. At the perimeter of the ceiling area where main or cross runners are not connected to the adjacent wall, provide interconnection between the runners at the free end to prevent lateral spreading. A metal strut or a #16-gage wire with a positive mechanical connection to the runner may be used and placed within 8 inches of the wall. Where the perpendicular distance from the wall to the first parallel runner is 8 inches or less, the stabilizer or #16 gage wire is not required.
- F. Install wall molding at the perimeter of the defined areas. Attach wall moldings to the wall at not more than 16-inches on center. On two adjacent walls attach each runner to the wall molding with a pop rivet. At opposite walls, provide metal struts or 16-gage wire with mechanical connection to the runner to prevent runners from spreading. Miter all corners of wall molding.
- G. Level the ceiling to within 1/8-inch in 10-feet in any direction.

3.4 LATERAL FORCE BRACING ASSEMBLY INSTALLATION

- A. Lateral force bracing assemblies consisting of a compression strut and four #12 gage splayed bracing wires oriented 90 degrees from each other are required for all ceiling areas.
1. Exception: Lateral force bracing may be omitted for suspended acoustical ceiling systems with a ceiling area not to exceed 144 square feet, for all values of SDS, when perimeter support is provided in accordance with Section 2.2 of IR 25-2.13 and perimeter walls are designed to carry the ceiling lateral forces.
- B. Lateral force bracing assemblies shall be spaced per Table 1 of IR 25-2.13 for all values of the component importance factor (Ip) of the ceiling.
- C. There shall be a brace assembly a distance of not more than one half of the above spacing from each surrounding wall, expansion joint and at the edges of any ceiling vertical offset. For example, where the brace spacing is 8' x 12', the edge distance shall be 4 feet in the direction of the 8 foot spacing and 6 feet in the direction of the 12 foot spacing.
- D. The slope of bracing wires shall not exceed 45 degrees from the horizontal plane and wires shall be taut. Splices in bracing wires shall develop the wire allowable load.
- E. Compression struts shall meet the following requirements:
1. The strut shall be sized to adequately resist the vertical component force induced by the ceiling bracing wires and have a maximum kl/r not to exceed 300. The struts listed in Appendix A meet this requirement for ceilings complying with the general requirements of IR 25-2.13.
 2. The strut shall not be more than one (horizontal) in six (vertical) out of plumb.

3.5 ATTACHMENT OF HANGER AND BRACING WIRES

- A. Fasten hanger wires with not less than 3 tight turns in 3 inches. Hanger wire loops shall be tightly wrapped and sharply bent to prevent any vertical movement or rotation of the member within the loops (see ASTM E580, Section 5.2.7.2).
- B. Fasten bracing wires with not less than 4 tight turns in 1-1/2 inches.
- C. Hanger and bracing wire anchorage to the structure shall be installed in such a manner that the direction of the anchorage aligns closely with the direction of the wire. (e.g. bracing wire ceiling clips must be bent as shown in the details and rotated as required to align closely with the direction of the wire, screw eyes in wood must be installed so they align closely with the direction of the wire, etc.).
- D. Separate all ceiling hanger and bracing wires at least 6 inches from all unbraced ducts, pipes, conduit, etc.
- E. Hanger and bracing wires shall not attach to or bend around obstructions including but not limited to: piping, ductwork, conduit and equipment. Provide trapeze or other supplementary support members at obstructions to allow typical hanger spacing. Brace assemblies must be configured and/or located in order to avoid obstructions in addition to maintaining the required brace assembly spacing.
- F. Provide additional hangers, struts and brace assemblies as required at all ceiling breaks, soffits, or discontinuous areas.
- G. Hanger wires that are more than one (horizontal) in six (vertical) out of plumb shall have counter-sloping wires. Note: See ASTM C636, Figure 1, for counter-sloping methods.
- H. Attachment of the bracing wires to the structure above and to the main runners shall be adequate for the load imposed. The weight (W_p) shall be taken as not less than 4 psf for calculating seismic forces (F_p).
- I. Post-installed anchors (e.g. expansion anchors, screw anchors and power actuated fasteners) shall have a current Evaluation Report acceptable to DSA in accordance with IR A-5.
- J. Power-actuated fasteners in concrete are not permitted for bracing wires.

3.6 EXPANSION JOINTS, SEISMIC SEPARATION JOINTS

- A. Expansion joints shall be provided in the ceiling at intersections of corridors and at junctions of corridors and lobbies or other similar areas.
- B. For ceiling areas exceeding 2,500 square feet, a seismic separation joint shall be provided to divide the ceiling into areas not exceeding 2,500 square feet in accordance with ASTM E580, Section 5.2.9.

3.7 CEILING FIXTURES, TERMINALS, AND DEVICES

- A. All fixtures, terminals, and other devices shall be mounted in a manner that will not compromise ceiling performance in accordance with Section 13.5.6.2.2 Item 5 of ASCE 7 as amended by CBC Section 1616A.1.20 (1616.10.16*) and ASTM E580 Sections 5.3 and 5.4.
- B. Ceiling panels shall not support any light fixtures, air terminals or devices.

- C. Penetrations through the ceiling for sprinkler heads and other similar devices that are not integrally tied to the ceiling system in the lateral direction shall have a 2-inch oversized ring, sleeve or adapter through the ceiling tile to allow free movement of 1-inch in all horizontal directions. Alternatively, per ASTM E580, Section 5.2.8.5, a flexible sprinkler hose fitting that can accommodate 1-inch of ceiling movement shall be permitted to be used in lieu of the oversized ring, sleeve, or adapter.
- D. Slack safety wires shall be considered hanger wires for installation and testing requirements.

3.8 LIGHT FIXTURES

- A. All light fixtures shall be positively attached to the ceiling suspension systems by mechanical means per CEC Article 410.36 to resist a horizontal force equal to the weight of the fixture. A minimum of two screws or approved fasteners are required at each light fixture, per ASTM E580, Section 5.3.1.
- B. Surface-mounted light fixtures shall be attached to the main runner with at least two positive clamping devices on each fixture. The clamping device shall completely surround the supporting ceiling runner and be made of steel with a minimum thickness of #14 gage. Rotational spring catches do not comply. A #12 gage slack safety wire shall be connected from each clamping device to the structure above. Provide additional supports when light fixtures are 8 feet or longer or exceed 56 lb. Maximum spacing between supports shall not exceed 8 feet.
- C. Light fixtures weighing less than or equal to 10 lb. shall have a minimum of one #12 gage slack safety wire connected from the fixture housing to the structure above.
- D. Light fixtures weighing greater than 10 lb. but less than or equal to 56 lbs. may be supported directly on the ceiling runners, but they shall have a minimum of two #12 gage slack safety wires connected from the fixture housing at diagonal corners to the structure above.
 - 1. Exception: All light fixtures greater than two by four feet weighing less than 56 lbs. shall have a #12 gage slack safety wire at each corner.
- E. All Light fixtures weighing greater than 56 lb. shall be independently supported by not less than four taut #12 gage hanger wires (one at each corner) attached from the fixture housing to the structure above or other approved hangers. The four taut #12 gage wires or other approved hangers, including their attachment to the structure above, shall be capable of supporting 4 times the weight of the fixture.

3.9 SERVICES WITHIN THE CEILING

- A. All flexible sprinkler hose fitting mounting brackets, ceiling-mounted air terminals or other services shall be positively attached to the ceiling suspension systems by mechanical means to resist a horizontal force equal to the weight of the component. Screws or approved fasteners are required. A minimum of two attachments are required at each component.
- B. Ceiling-mounted air terminals or other services weighing less than or equal to 20 lb. shall have one #12 gage slack safety wire attached from the terminal or service to the structure above.
- C. Flexible sprinkler hose fittings, ceiling-mounted air terminals or other services weighing more than 20 lb. but less than or equal to 56 lb. shall have two #12 gage slack safety wires (at diagonal corners) connected from the terminal or service to the structure above.

- D. Flexible sprinkler hose fittings, ceiling-mounted air terminals or other services weighing more than 56 lb. shall be supported directly from the structure above by not less than four taut #12 gage hanger wires attached from the terminal or service to the structure above or other approved hangers. The four taut #12 gage wires or other approved hangers, including their attachment to the structure above, must be capable of supporting four times the weight of the unit.

3.10 OTHER DEVICES WITHIN THE CEILING

- A. All lightweight miscellaneous devices, such as strobe lights, occupancy sensors, speakers, exit signs, etc., shall be attached to the ceiling grid per Section 2.6.2 a) of IR 25-2.13. In addition, devices weighing more than 10 lbs. shall have a #12 gage slack safety wire anchored to the structure above per Section 2.6.1 b) of IR 25-2.13. Devices weighing more than 20 lbs. shall be supported from the structure above using details provided by the registered design professional (RDP).

3.11 PENDANT MOUNTED LIGHT FIXTURES

- A. Where pendant mounted light fixtures are to be installed in areas with a suspended ceiling, the construction documents shall include complete support details complying with IR 25-2.13 and DSA IR 16-9.
- B. Support pendant-mounted light fixtures directly from the structure above with hanger wires or cables passing through each pendant hanger and capable of supporting 2 times the weight of the fixture.
- C. If a pendant mounted light fixture is directly and independently braced below the ceiling (i.e., aircraft cables to walls), then a brace assembly is not required above the ceiling.
- D. If a pendant mounted light fixture is free to swing 45 degrees from vertical in all directions, and is not directly and independently braced below the ceiling, then a bracing assembly is only required where the pendant hanger penetrates the ceiling. Special details are required to attach the pendant hanger to the bracing assembly to transmit the horizontal and vertical forces. Exception: Where the weight of the fixture is less than 20 pounds, the vertical component of the brace force need not be considered so no compression strut/post is required.
- E. Rigid conduit shall not be used for attachment of the fixtures.

3.12 INSTALLATION OF ACOUSTICAL UNITS

- A. Install acoustical units with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
 - 1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
 - 2. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
 - 3. Install hold-down clips and seismic clips in areas indicated, in areas required by authorities having jurisdiction; space as recommended by panel manufacturer's written instructions unless otherwise indicated.

- a. Hold-Down Clips: Space 24 inches o.c. on all cross runners.
- 4. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.13 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.
- C. Remove all debris resulting from the work of this section.

END OF SECTION

06/06/18

SECTION 09 65 13

RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient base.
2. Resilient molding accessories.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Sections:

1. Section 09 65 19 – Resilient tile Flooring.
2. Section 09 68 16 – Sheet Carpeting.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

C. Samples for Initial Selection: For each type of product indicated.

D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.

E. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.4 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Coordinate mockups in this Section with mockups specified in other Sections.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 THERMOSET-RUBBER BASE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Roppe Corporation, USA; Pinnacle Rubber Base.
 - 2. Armstrong World Industries.
 - 3. Burke Mercer Flooring Products; a division of Burke Industries Inc.
 - 4. Flexco.
 - 5. Johnsonite; A Tarkett Company.
- B. Product Standard: ASTM F 1861, Type TS (Thermoset Vulcanized Rubber), Group I (solid, homogeneous).
 - 1. Style and Location:
 - a. Style A, Straight: Provide in areas with carpet.
 - b. Style B, Standard Toe (Cove base): Provide in areas with resilient flooring.
- C. Thickness: 0.125 inch.
- D. Height: 4 inches unless otherwise noted; 6 inches where shown.
- E. Lengths: Coils in manufacturer's standard length.

- F. Outside Corners: Preformed.
- G. Inside Corners: Preformed.
- H. Colors: As selected by Architect from full range of industry colors.

2.3 RUBBER MOLDING ACCESSORY

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Armstrong World Industries, Inc.
 - 2. Burke Mercer Flooring Products; a division of Burke Industries Inc.
 - 3. Flexco.
 - 4. Johnsonite; A Tarkett Company.
 - 5. Roppe Corporation, USA.
- B. Description: Reducer strip for resilient flooring; and transition strips.
- C. Profile and Dimensions: As indicated.
- D. Locations: Provide rubber molding accessories in areas indicated.
- E. Colors: As selected by Architect from full range of industry colors..

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
 - 1. Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are the same temperature as the space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum horizontal surfaces thoroughly.
 - 3. Damp-mop horizontal surfaces to remove marks and soil.

- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION

06/06/18

SECTION 09 65 19

RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Vinyl composition floor tile.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Sections:
 - 1. Section 09 65 13 – Resilient Base and Accessories.
 - 2. Section 09 05 61.13 – Moisture Vapor Emission Control.

1.2 REFERENCES

- A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

ASTM International (ASTM)
General Services Administration Federal Specifications (Fed. Spec.)
National Fire Protection Association (NFPA)

- B. National Fire Protection Association (NFPA):
 - 1. NFPA 253 Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
 - 2. NFPA 258 Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

1.3 ACTION SUBMITTALS

- A. Product Data: Submit manufacturers product data for each type of resilient tile flooring.
- B. Shop Drawings: For each type of resilient floor tile.
 - 1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 2. Show details of special patterns.
- C. Samples:
 - 1. Submit full size samples of each different color and pattern of floor tile required.
- D. Manufacturer's Installation Procedures: Submit a current copy of the flooring manufacturer's recommended standard installation procedure for each type of flooring material.

- E. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

- 1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

- A. Regulatory Requirements. The quantity of volatile organic compounds (VOC) used for flooring installation shall not exceed the limits permitted under the current regulations of the Bay Area Air Quality Management District.
- B. Requirements for Physically Disabled: Provide resilient flooring meeting the slip resistant requirements of 0.5 minimum in accordance with ASTM D2047, the 2016 California Building Code (CBC) Title 24 Part 2; and 2010 ADA Standards for Accessible Design.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockups for floor tile including resilient base and accessories.
 - a. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations directed by Architect.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Pre-Installation Meeting: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements. Comply with Section 01 31 19 – Project Meetings.

1.8 QUALIFICATIONS

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation.

1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.10 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F in spaces to receive floor tile during the following time periods:
 1. 48 hours before installation.
 2. During installation.
 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

1.11 WARRANTY

- A. Project Warranty: Refer to Section 01 78 36 - Warranties, for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
 1. Warranty Period: Five (5) year limited warranty commencing on Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 1. Critical Radiant Flux Classification: Class 1, > 0.45 W/sq. cm.
 2. Smoke Density: Less than 450 per NFPA 258 (ASTM E 662).

2.2 VINYL COMPOSITION FLOOR TILE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong World Industries, Inc.; "Standard Excelon;" "Premium Excelon."
 - 2. Johnsonite; a Tarkett company; "Azrock VCT."
 - 3. Mannington Mills, Inc.
- B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch.
- E. Size: 12 inches by 12 inches.
- F. Colors and Patterns: As selected by Architect from manufacturer's full range of colors and patterns.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
 - 1. Where floors require extensive leveling or repair necessitating several thicknesses of leveling compound, use one of the following products or equal:

Industrial Products, Inc.; Vi-Tex Leveling Compound.
Armstrong Floor Div.; Underlayment S-183.
- B. Adhesives and Primers: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Fluid-applied moisture vapor emission control system is specified in Section 09 05 61.13 All surfaces scheduled to receive resilient flooring shall receive moisture vapor emission control system.
 - 1. Alkalinity Testing: Not required. Confirm that moisture vapor emission control system as specified in Section 09 05 61.13 has been installed.
 - 2. Adhesion Testing: Perform tests recommended by floor tile manufacturer.
 - 3. Moisture Testing: Not required. Confirm that moisture vapor emission control system as specified in Section 09 05 61.13 has been installed.
 - 4. Anhydrous Calcium Chloride Test: Not required. Confirm that moisture vapor emission control system as specified in Section 09 05 61.13 has been installed. Relative Humidity Testing: Not required. Confirm that moisture vapor emission control system as specified in Section 09 05 61.13 has been installed.
- B. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.
- F. Do not begin installation until work of other trades in the area, including painting, has been completed.
- G. Apply concrete slab primer, if recommended by flooring manufacturer, before applying adhesive. Apply according to manufacturer's directions.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles square with room axis, unless otherwise indicated.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles with grain running in one direction.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- I. Lay tile when adhesive has set tacky, starting at the center of the room and working toward walls. Embed each tile in adhesive with closely fitted, straight, hairline joints. Do not cut tile except at walls or obstructions. Neatly scribe around pipes, fixtures, and equipment to form tight joints free of gaps. Finished floors shall be smooth and free from buckles, cracks, breaks, waves, and projecting edges and shall fit neatly at pipes and other installations and obstructions. Remove all excess adhesive.
- J. Install edging strips wherever tile terminates at an opening or where there is an unprotected edge. Top of strips shall be flush with top of tile.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply two coat(s).
 - 2. Polish with mechanical buffer.
- E. For the entire period between installation of resilient flooring and acceptance of the Work by the Owner, protect floors from damage using methods recommended by the flooring manufacturer.

END OF SECTION

06/06/18

SECTION 09 65 43

LINOLEUM FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Linoleum sheet flooring.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Sections:

1. Section 09 05 61.13 "Moisture Vapor Emission Control."

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of linoleum flooring.

1. Include flooring layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
2. Show details of special patterns.

C. Samples for Initial Selection: For each type of linoleum flooring indicated.

D. Samples for Verification: For each type of linoleum flooring, in manufacturer's standard size samples of each different color and pattern required.

1. Heat-Welding Bead: Include manufacturer's standard-size Samples, but not less than 6 inches long, of each color required.

E. Heat-Welded Seam Samples: For each linoleum flooring product and welding bead color and pattern combination required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to rigid backing and prepared by Installer for this Project.

F. Product Schedule: For linoleum flooring. Use same designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of linoleum flooring to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Sheet Flooring: Furnish quantity of sheet flooring not less than 5% of amount installed. Furnish in roll form and in full roll width for each type, color, and pattern of sheet flooring installed.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for flooring installation and seaming methods indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by flooring manufacturer for installation techniques required.
- B. Mockups: Build mockup to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Coordinate mockup in this Section with mockups specified in other Sections.
 - a. Size: Minimum 100 sq. ft. for each type, color, and pattern in location directed by Architect.
 - 2. Approval of mockup does not constitute approval of deviations from the Contract Documents contained in mockup unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockup may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 65 deg F or more than 90 deg F.
 - 1. Sheet Flooring: Store rolls upright.

1.8 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 65 deg F or more than 85 deg F, in spaces to receive flooring during the following periods:
 - 1. 72 hours before installation.
 - 2. During installation.
 - 3. 72 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 85 deg F.
- C. Close spaces to traffic during flooring installation.

- D. Close spaces to traffic for 72 hours after flooring installation.
- E. Install flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For linoleum flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. Slip Resistance: ≥ 0.6 Static Coefficient of Friction, per ASTM D-2047, Standard Test Method for Static Coefficient of Friction of Polished-Coated Flooring.
- C. Static Load Limit: Passes at 150 PSI with less than 0.005-inch residual indentation, per ASTM F-970, Standard Test method for Static Load Limit.

2.2 LINOLEUM SHEET FLOORING

- A. Basis-of-Design Manufacturers: Subject to compliance with requirements, provide Johnsonite; A Tarkett Company, Linoleum Sheet Flooring, or comparable product by one of the following:
 - 1. Forbo Industries, Inc.
 - 2. Armstrong Commercial Flooring.
 - 3. Substitutions: Section 01 25 13 – Product Options and Substitutions.
- B. Basis-of-Design Product: Johnsonite; www.tarkettna.com; HARMONIUM xf² (Linoleum) Sheet Flooring.
 - 1. Homogeneous layer of oxidized linseed oil and natural resins mixed with wood or cork flour and limestone.
 - 2. xf² finish for reduced maintenance.
- C. Linoleum Sheet Flooring: ASTM F 2034, Type I, linoleum sheet with backing.
 - 1. Roll Size: In manufacturer's standard length, but not less than 78 inches wide.
- D. Wear Layer/Overall Thickness:
 - 1. 0.080 inch (2.0 mm) (Veneto only).
 - 2. 0.10 inch (2.5 mm) (Veneto, Lenza, Tonali, and Etrusco).
- E. Heat-Welding Bead: For seamless installation, solid-strand product of linoleum flooring manufacturer.
 - 1. Colors: Match linoleum flooring.
- F. Colors and Patterns: As selected by Architect from manufacturer's available patterns (Veneto, Lenza, Tonali, or Etrusco).

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by linoleum flooring manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by flooring and adhesive manufacturers to suit products and substrate conditions indicated.
 - 1. Johnsonite #950 Linoleum Adhesive.
 - 2. Johnsonite #975 Two-Part Urethane Adhesive.
- C. Integral-Flash-Cove-Base Accessories:
 - 1. Cove Filler Strip: 1-inch radius, provided or approved by manufacturer.
 - a. Johnsonite CFS-00-A Cove Filler Strip.
 - 2. Cove-Base Cap Strip: Square metal, vinyl, or rubber cap, provided or approved by manufacturer.
 - a. Johnsonite cove cap as selected by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of flooring.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to linoleum flooring manufacturer's written instructions to ensure adhesion of flooring.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by linoleum flooring manufacturer. Do not use solvents.
- C. Concrete Moisture Testing: Not required. Confirm that moisture vapor emission control treatment as specified in Section 09 05 61.13 has been successfully applied to concrete slab substrates.
- D. Concrete pH Testing: Not required. Confirm that moisture vapor emission control treatment as specified in Section 09 05 61.13 has been successfully applied to concrete slab substrates.
- E. Adhesion Testing: Perform tests recommended by manufacturer.

- F. Fill cracks, holes, depressions and irregularities in the substrate with good quality Portland cement based underlayment leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- G. Floor covering shall not be installed over expansion joints.
- H. Do not install flooring until materials are the same temperature as space where they are to be installed.
 - 1. At least 72 hours in advance of installation, move flooring and installation materials into spaces where they will be installed.
- I. Immediately before installation, sweep and vacuum clean substrates to be covered by flooring.

3.3 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions for installing flooring.
- B. Scribe and cut flooring to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, thresholds, door frames, and nosings.
- C. Extend flooring into toe spaces, door reveals, closets, and similar openings.
- D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on flooring as marked on substrates. Use chalk or other nonpermanent marking device.
- E. Install flooring on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of flooring installed on covers and adjoining flooring. Tightly adhere flooring edges to substrates that abut covers and to cover perimeters.
- F. Adhere flooring to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- G. Heat-Welded Seams: For seamless installation, comply with ASTM F 1516. Rout joints and heat weld with welding bead to fuse sections permanently into a seamless flooring installation. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.

3.4 LINOLEUM SHEET FLOORING INSTALLATION

- A. Comply with manufacturer's written instructions for installing linoleum sheet flooring.
- B. Unroll linoleum sheet flooring and allow it to stabilize before cutting and fitting.
- C. Lay out linoleum sheet flooring as follows:
 - 1. Maintain uniformity of flooring direction.
 - 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in flooring substrates.
 - 3. Match edges of flooring for color shading at seams.
 - 4. Avoid cross seams.

5. Eliminate deformations that result from hanging method used during drying process (stove bar marks).

D. Heat Welded Seam:

1. Recess scribe the seam with a slight gap not to exceed 1/64" (0.4mm) to help guide the router.
2. Insert a scrap piece of material under the scribe mark to protect the seam edge of the first piece.
3. Use a sharp knife to cut the seam following the scribe mark. Cut must be perpendicular, do not angle the knife blade.
4. Remove the scrap material and seam trimmings before rolling the seam with a small hand roller.
5. Roll the seam area with a 100 pound three-section roller.
6. Wait a minimum 24 hours after installation before heat welding the seams.
7. Route the material down to the jute taking care not to cut through the jute fibers.
8. Use linoleum manufacturer's linoleum weld rod.

- D. Integral-Flash-Cove Base: Cove flooring 6 inches up vertical surfaces. Support flooring at horizontal and vertical junction with cove strip. Net fit flooring material into the appropriate cove cap strip.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting linoleum flooring.
- B. Perform the following operations immediately after completing linoleum flooring installation:
1. Remove adhesive and other blemishes from surfaces.
 2. Sweep and vacuum surfaces thoroughly.
 3. Damp-mop surfaces to remove marks and soil.
- C. Protect linoleum flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. After allowing drying room film (yellow film caused by linseed oil oxidation) to disappear, cover linoleum flooring until Substantial Completion.

END OF SECTION

06/06/18

SECTION 09 68 13

TILE CARPETING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes modular carpet tile.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Requirements:
 - 1. Section 09 65 13 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.
 - 2. Section 09 05 61.13 "Moisture Vapor Emission Control."

1.02 ACTION SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics, sizes, patterns, colors available, and method of installation.
- B. Shop Drawing showing columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required as well as direction of carpet pile and pattern, location of edge moldings and edge bindings shall be submitted to the Architect for approval prior to installation.
- C. Product Schedule: For carpet tile. Use same room designations indicated on drawings.
- D. Verification Samples: Submit samples illustrating color and pattern for each carpet material specified.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.03 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Certifications: Manufacturer to submit copies of the following independent laboratory reports showing compliance with requirements per these methods outlined in Part 2 of this document. Submitted results shall represent average results for production goods of the specified style.
 - 1. ASTM E-648 Flooring Radiant Panel.
 - 2. ASTM E-662: Smoke Density.
 - 3. AATCC 134: Electrostatic Propensity.
 - 4. ASTM D-3936: Delamination.
 - 5. Other from methods specified in Part 2.

- D. Submit documentation for CRI's Green Label Plus (GLP) program for carpet.
- E. Submit documentation for adhesive; to meet the requirements of CRI's Green Label Plus program.
- F. Submit documentation for adhesives; adhesives must be below the VOC content limits specified by the South Coast Air Quality Management District Rule #1168.
- G. Sample Warranty: For special warranty.

1.04 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Include maintenance procedures, recommendations for maintenance materials and equipment, and suggested schedule for cleaning.

1.05 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Company specializing in manufacturing specified carpet with minimum 10 years documented experience.
 - 2. Upon request, manufacturer to provide representative to assist in project start-up and to inspect installation while in process and upon completion. Representative will notify designated contact if any installation instructions are not followed.
 - 3. Single Source Responsibility: Obtain each type of product from one source and by a single manufacturer.
- B. Installer Qualifications:
 - 1. Flooring contractor must be certified by the manufacturer prior to bid.
 - 2. Flooring contractor to be a specialty contractor normally engaged in this type of work and shall have prior experience in the installation of these types of materials.
 - 3. Flooring contractor possessing Contract for the product installation shall not sub-contract the labor without written approval of the Construction Manager.
 - 4. Flooring contractor will be responsible for proper product installation, including floor testing and preparation as specified by the manufacturer and JOB CONDITIONS herein.
 - 5. Flooring contractor to provide Owner a written installation warranty that guarantees the completed installation to be free from defects in materials and workmanship for a period of one year after job completion.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI's "CRI Carpet Installation Standard."

- B. Deliver materials to the site in manufacturer's original packaging listing manufacturer's name, product name, identification number, and related information.
- C. Store in a dry location, between 65 degrees F and 90 degrees F and a relative humidity below 65%. Protect from damage and soiling. Store in pallet form as supplied by Manufacturer. Do not stack pallets.
- D. Make stored materials available for inspection by the Owner's representative.
- E. Store materials in area of installation for minimum period of 48 hours prior to installation.

1.08 FIELD CONDITIONS

- A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.
- B. Sub-floor preparation is to include all required work to prepare the existing floor for installation of the product as specified in this document and Manufacturer's installation instructions.
- C. Please see Flex-Aire Cushion Modular Installation & Floor Preparation Instructions for specific requirements for moisture vapor emission rate, ambient conditions, and other requirements.
- D. All material used in sub-floor preparation and repair shall be recommended by the carpet manufacturer and shall be chemically and physically compatible with the carpet system being bid.
- E. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period and near those indicated for final occupancy.
 - 1. Maintain minimum 65 degrees F ambient temperature and 65% Relative Humidity for 72 hours prior to, during, and 48 hours after installation.

1.09 PRODUCT WARRANTY

- A. Warranty to be sole source responsibility of the Manufacturer. Second source warranties and warranties that involve parties other than the carpet manufacturer are unacceptable.
- B. If the product fails to perform as warranted when properly installed and maintained, the affected area will be repaired or replaced at the discretion of the Manufacturer.
- C. Chair pads are not required, but are recommended for optimum textural performance. Absent the use of chair pads, more intensive maintenance will be required for areas in direct contact with chair caster traffic, and some degree of appearance change is to be expected.
- D. The non-prorated lifetime limited warranty shall specifically warrant against:
 - 1. Excessive Surface Wear: More than 15% loss of pile fiber weight
 - 2. Excessive Static Electricity: More than 3.0 kV per AATCC 134
 - 3. Resiliency Loss of the Backing: More than 10% loss of backing resiliency

4. Delamination
5. Edge Ravel
6. Zippering

E. Tuft Bind warranty in lieu of edge ravel and zippering is not acceptable.

PART 2 - PRODUCTS

2.01 RECYCLED CONTENT

- A. Product must contain a minimum of 21% recycled content by weight. This percentage is calculated by dividing the weight of recycled content in one square yard of finished product by the total weight of one square yard of finished product, and multiplying by 100. $[(\text{Recycle Content Weight}) / (\text{Total Product Weight}) \times 100]$.
- B. Product must contain 4% post-consumer recycled content by weight from recycled post consumer carpet. This ensures that carpet is diverted from landfills for the production of the product and that virgin resource use in the product is reduced.
- C. Recycled content must be certified by a neutral, independent, third party organization such as Scientific Certification Systems. Product must carry product label certifying overall recycled content.
- D. Product must be available inclusive of 100% recycled content secondary backing.
 1. Recycled content must not be subject to availability. Post industrial and post consumer recycled content of product installed must be the same as those required by Project requirements.
 2. Recycled content must be expressed as an exact percentage or a range. Statements such as "up to 60%" recycled content are not acceptable.
 3. Manufacturer must fully comply with FTC Part 260 "Guides for the Use of Environmental Marketing Claims," with respect to advertising, labeling, product inserts, catalogs and sales presentations of all its flooring products submitted and sold.

2.02 PRODUCT RECYCLABILITY

- A. Product must meet FTC guides for recyclability and must be one hundred percent (100%) closed-loop recyclable back into flooring. A manufacturer cannot claim that a product or any portion of a product is recyclable if it is incinerated even if incineration is used to produce heat and power (i.e. waste-to-energy) per FTC guides 16 CFR section 260.7 (d) example 3.
- B. Recyclability of product installed must be the same as those required by Project requirements.

2.03 NSF 140 CERTIFICATION

- A. Product must be certified at the Gold level to ANSI standard NSF 140, the Sustainable Carpet Assessment Standard (SCAS). Product certification must be conducted by an independent, third party organization such as Scientific Certification Systems. Provide documentation..

2.04 FIBER

- A. Nylon Fiber: Bulked Continuous Filament (BCF) Nylon in a loop pile construction \ TDX Nylon; 60 % Solution Dyed, 40% Yarn Dyed, Multi-Colored.
- B. For yarn containing recycled content, report post consumer and post industrial recycled content of the pile face yarn based on total yarn weight i.e. $[(\text{Recycle Content in Pile Face Yarn}) / (\text{Total Weight of Pile Face Yarn}) \times 100]$
- C. Fiber to contain carbon-core filament for permanent static control. Topical treatments are not allowed.
- D. Durable stain inhibitor should be applied to the fiber during product manufacturing to resist fiber staining and soiling. Application Rate: 2% of Face Weight.

2.05 CUSHION CHARACTERISTICS

- A. Primary Backing: Synthetic Non-Woven.
- B. Secondary Backing: Closed-Cell Cushion.
 - 1. Cushion Type: Closed Cell Cushion
 - 2. Cushion Weight (ASTM D-1667): 35.5 oz/sq yd
 - 3. Cushion Thickness (ASTM D-1667): 0.156"
 - 4. Cushion Density (ASTM D-1667): 18.5 lbs/cu ft +/- 5%
 - 5. Cushion Compression Set (ASTM D-1667): Max. 10%
 - 6. Cushion Compression Force Deflection (ASTM D-1667): Min. 5 psi @ 25%; Max. 25 psi @ 25%
 - 7. Fiberglass Reinforced.
 - 8. Impermeable to moisture.
 - 9. Face yarn fully fused to secondary backing system that will not delaminate
 - 10. Delamination: No delamination per ASTM D3936
 - 11. Product must not contain pesticides (US EPA Registered Antimicrobials). Installation adhesives are exempt from this section.
 - 12. Tile Size: 24" x 24"

2.06 PERFORMANCE CHARACTERISTICS

- A. Test reports for the following performance assurance testing to be submitted upon request. Submitted results shall represent average results for production goods of the referenced style.
- B. Requirements listed below must be met by all products.
 - 1. Flooring Radiant Panel:
ASTM E-648 / NFPA 253: Class 1 (CRF: 0.45 watts/sq cm or greater)
 - 2. Federal Flammability:
CPSC FF 1-70: Passes. (ASTM D-2859).
 - 3. Smoke Density:
ASTM E-662 / NFPA 258: < 450 Flaming Mode
 - 4. Electrostatic Propensity:
AATCC 134 (Step & Scuff): 3.0 kV or less

5. Static Coefficient of Friction:
ASTM C-1028: Passes ADA Requirements for Accessible Routes (minimum 0.60)
6. Delamination of Secondary Backing of Pile Floor Coverings:
ASTM D-3936: No Delamination
7. Lightfastness:
AATCC 16E: > 4 @ 60 hours yarn dyed; > 4 @ 100 hours solution dyed
8. TARR:
Severe Traffic: 3.5 minimum; All other applications: 3.0 minimum.
9. Dimensional Stability:
Aachen / ISO 2551: Maximum Change +/- 0.149%
11. Moisture Barrier:
Moisture Penetration by Impact @ 10 psi: No Penetration of backing after 10,000 impacts
12. Other: As specified in Articles 2.03, 2.04 and 2.05 of this specification.

2.07 PRODUCT SPECIFICATIONS

A. Manufactured by Tandus Centiva

1. Infinity #05849, Flex-Aire Cushion Modular. Color(s): To be selected by Architect.
2. Product Size: 18" x 18", 24" x 24", and 36" x 36".
3. Pattern Scale: Small.
4. Pattern Type: Texture.
5. Coordinating Group: Coordinate Group 14.
6. Primary Backing: Non-woven synthetic fiber.
7. Construction: Level Loop.
8. Gauge: 1/13;
9. Stitch Rate: 9.5 stitches / inch
10. Pile Height Average: 0.117 inch.
11. Total Product Thickness: 0.283 inch.
12. Fiber System: BCF Nylon with Static Control & Ensure
13. Dye Method: 60% Solution Dyed; 40% Yarn Dyed.
14. Fluorine-free Soil Protection: Eco-Ensure.
15. R-Value: 0.90 Hr-ft²-°F/Btu.

16. Static Coefficient of Friction: ASTM C-1028; Passes ADA requirements.
 17. Electrostatic Propensity: 2.0 kV (AATCC 134); Permanent Conductive Fiber.
 18. Flooring Radiant Panel: ASTM E-648 or NFPA 253: Class 1.
 19. Acoustic Requirements: Noise Reduction Coefficient (NRC): 0.22 Minimum.
 20. Cushion Compression Set: Maximum 10%.
 21. Cushion Compression Force Deflection: Minimum 5 lbs/sq. inch @ 25%; Maximum 25 lbs/sq. inch at 25%.
 22. Cushion Density 18.5 lbs per cubic foot.
 23. Cushion Thickness: 0.156 inch.
 24. Face Weight: 20 oz/sq yd.
 25. Third Party Certification: NSF 140 Platinum rating.
 26. Total Product Recycled Content (based on Total Weight) Minimum 21%.
 27. Total Product Post-Consumer Content (based on Total Weight): 4%.
 28. Environmental Impact: No pesticides added to product (US EPA Registered Antimicrobials).
- B. Substitutions: Subject to compliance with all requirements, "or equal" products must match the selected colors, have similar aesthetic appearance and tuft density, factory-applied "dry" adhesive, equivalent NSF 140 certification, recycled content certification labels and recyclability. Substitution sample and submittals must be submitted for written approval of quality and color at least ten days prior to bid to be considered. Sample of proposed substitution must be inclusive of both the face and proposed backing (color-only sample not acceptable).

2.05 ACCESSORIES

- A. Materials recommended by Manufacturer for patching, leveling, priming, etc.
- B. Base, Carpet Edge, and Transition Strips: As specified in Section 09 65 13.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern, and potential defects.
- C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 03 30 53 "Miscellaneous Cast-in-Place Concrete" and that surfaces are free of cracks, ridges,

depressions, scale, and foreign deposits.

1. Moisture and pH testing: Not required. Confirm that moisture vapor emission control system specified in Section 09 05 61.13 has been successfully applied to concrete slab substrate.

3.02 PREPARATION

- A. General: Comply with CRI's "Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Prepare sub-floor to comply with criteria established in Manufacturer's installation instructions. Use only preparation materials that are acceptable to the Manufacturer.
 1. Remove all deleterious substances from substrate(s) that would interfere with or be harmful to the installation.
 2. Remove sub-floor ridges and bumps. Fill cracks, joints, holes, and other defects.
- C. Verify that sub-floor is smooth and flat within specified tolerances and ready to receive carpet.
- D. Verify that substrate surface is dust-free and free of substances that would impair bonding of product to the floor.
- E. There will be no exceptions to the provisions stated in the Manufacturer's installation instructions.

3.03 INSTALLATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.
- B. Install product in accordance with Manufacturer's installation instructions. Product must have low VOC, factory applied, "dry" adhesive. A peel and stick method applied to the back at the time of manufacture is preferred.
- C. Product must meet the requirements of CRI's Green Label Plus (GLP) program for carpet. Provide documentation.
- D. Adhesive must meet the requirements of CRI's Green Label Plus program for adhesive. Provide documentation.
- E. Adhesives must be below the VOC content limits specified by the South Coast Air Quality Management District Rule #1168. Provide documentation.
- F. No US EPA registered pesticides (antimicrobials) are to be added to the product. Antimicrobial treatments are registered with the EPA as preservatives of the products only, and no health benefit should be claimed or expected. If antimicrobials are added then third party documentation with a seal is required stating that the pesticides used will cause NO HARM to the occupants. Installation adhesives are exempt from this section.
- G. Product as installed to be securely attached to the floor in compliance with Americans with Disabilities Act (ADA), Section 4.5.3.
- H. Where demountable partitions or other items are indicated for installation on top of finished

SECTION 09 77 23

FABRIC COVERED TACK PANELING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Fabric covered tack paneling.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Sections:
 - 1. Section 09 29 00 - Gypsum Board: Wall Substrates.
 - 2. Section 26 51 00 - Lighting: Permanent during installation.

1.2 REFERENCES

- A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

1.3 ACTION SUBMITTALS

- A. Product Data: Submit manufacturers' product data for each type of panel core material and fabric backed vinyl covering specified.
 - 1. Include technical information, installation instructions, and maintenance instructions.
 - 2. Include data on physical characteristics, durability, fade resistance and flame resistance characteristics.
- B. Shop Drawings: Submit shop drawings showing panel dimensions, details, locations, trim, anchoring and all other pertinent information.
- C. Samples: Submit samples for verification: 8-inch square units displaying the substrate material and fabric backed vinyl coating and demonstrating quality, weight, color range and pattern variation.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: Submit certificates signed by manufacturers of core material and wall coverings certifying that materials furnished comply with specified requirements.
 - 1. Include certified test reports evidencing compliance with requirements for fire performance characteristics and physical properties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Submit manufacturer's written instructions for recommended maintenance of vinyl covered tackboard panel specified. Include acceptable methods and materials recommended to maintain products in anticipated areas of use.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Replacement Materials: Furnish not less than 3 percent of the total installed, or minimum 4 of each type, color, and pattern of vinyl covered tackboard panel installed for maintenance purposes. Furnish replacement materials from same production run as installed materials. Protect material with clearly marked packaging indicating product identification and project location.

1.7 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Provide facing materials that have been tested and bear the UL label and marking, or marking of other testing agency acceptable to the State Fire Marshal, indicating the following fire performance characteristics tested in accordance with ASTM E84.
 - 1. Flame Spread: Not more than 25.
 - 2. Smoke Developed: Not more than 50.
- B. Physical Properties for Vinyl Wallcoverings: Adhesion of vinyl film, minimum 3-pounds per square inch when tested in accordance with ASTM D751.
- C. Regulatory Requirements. The quantity of volatile organic compounds (VOC) used in adhesives, substrate fillers, primer/sealers, surface cleaners, shall not exceed the limits permitted under the current regulations for architectural coatings of the Bay Area Air Quality Management District.

1.8 QUALIFICATIONS

- A. Manufacturer: Provide each type of vinyl covered tack panel from a single source with ability to provide products of consistent quality in appearance and physical properties.
- B. Installers: Installation by skilled and experienced installers with no less than three years of documented experience installing vinyl covered tack panels of the types and extent specified for the project.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver vinyl wallcoverings to the project site in unbroken and undamaged original factory wrappings and clearly labeled with the manufacturer's identification label, quality or grade and lot number.
- B. Protect fabric covered tack panels from moisture in shipment, storage and installation.
- C. Store materials inside in original undamaged packaging, in a well ventilated area protected from weather, moisture, soiling, extreme temperatures and humidity. Lay panels flat, blocked off the floor to prevent sagging and warping. Maintain temperature in storage area above 40-degrees F.

1.10 PROJECT CONDITIONS

- A. Do not begin installation until spaces for vinyl covered tack panels have been enclosed and continuously ventilated and heating and heated to maintain substrate surface and instructions.
- B. Maintain constant recommended temperature and humidity for at least 72 hours prior to, throughout the installation period and for 72 hours after vinyl covered tack panel installation completion.
- C. Verify actual wall surfaces by accurate field measurement before fabrication.

1.11 WARRANTY

- A. Submit manufacturer's 5 year written warranty against manufacturing defects.

PART 2 - PRODUCTS

2.1 FABRIC-COVERED TACK PANELING

A. Manufacturers:

- 1. Chatfield-Clarke Co. 909-823-4297 www.chatfield-clarke.com.
- 2. Lamvin Inc 760-806-6400 www.lamvin.com
- 3. ABC School Equipment 951-817-2200 www.pvsua.com
- 4. Claridge Products West 951-734-6262 www.claridgeprodusts.com
- 5. Substitutions: Section 01 25 13 "Product Options and Substitutions."

2.2 MATERIALS

A. Class 1/A Panel Substrate:

- 1. Composition: Compressed wood fiber.
- 2. Density: 16 pcf.
- 3. Weight: 0.64 pounds per square foot.
- 4. Thickness: 1/2 inch.
- 5. Size: 48 inches wide by 96 inches high. Height required to achieve seamless installation.
- 6. Fire Rating: U.L. Label.
 - a. Flame Spread: 15.
 - b. Smoke Developed: 50.
- 7. Edge Treatment: Square.
- 8. Board shall be manufactured specially as a substrate for vinyl-covered wall panels.
- 9. Board shall be asphalt-free, with an ironed-on coating.
- 10. Acceptable Manufacturers:
 - a. Chatfield-Clarke Co.; Flame resistant industrial insulation board.
 - b. LBI Boyd Wallcoverings: www.lbiboyd.com; FR Tackpanels.
 - c. Emco; www.emco.com; Standard Fiberboard Board.

B. Fabric: Unbacked 100% polyethylene, containing no PVC, chlorine, plasticizers, heavy metals, topical finishes, harmful dyes or ozone depleting chemicals and shall not produce dioxin or hydrochloric gas in accidental fire.

- 1. Carnegie Fabrics; www.carnegiefabrics.com;
Substitutions: Section 01 25 13 – Product Options and Substitutions.

- a. Basis of Design: Carnegie – Xorel®.
- 2. Pattern and Color:
 - a. Pattern: As selected by Architect from manufacturer's standard patterns.
 - b. Color: As selected by Architect from manufacturer's standard colors.

2.3 ACCESSORIES

- A. Adhesives:
 - 1. Panel Adhesive: Provide adhesive produced for use in application of panels over substrate.
 - 2. Fabric Adhesive: Provide adhesive, primer, and sealer, produced expressly for use with specified wallcovering on core specified. Provide materials which are mildew-resistant and nonstaining to wallcovering.
- B. Metal Trim: Extruded aluminum with clear anodized finish made specifically for this type of installation. Trim shall be provided with concealed mounting flange for countersunk screws. Exposed face shall be 1/2-inch maximum.
- C. Screws: 20 gauge or heavier, self-tapping drywall type steel screw.

2.4 FABRICATION

- A. Apply specified primer to selected core material as recommended by core manufacturer.
- B. Apply recommended adhesive to exposed face of core.
- C. Laminate fabric covering in numbered sequence from fabric rolls to ensure minimum color variation between tackable panels. Tack Panels must be machine laminated.
- D. Attach fabric covering to cores to produce installed panels with visible surfaces fully covered and free from bubbles, sags, wrinkles, distortion of fabric covering, adhesive or foreign material.
- E. Wrap panel substrate with fabric, covering vertical edges and returning fabric approximately 2 inches on back of panel. No fabric seams will be permitted within a panel face.
- F. Provide sizes for panel configurations to match heights and widths as indicated on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install in strict accordance with Manufacturer's installation instructions. Use recommended adhesive and concealed fasteners.
- B. Uniformly spread adhesive to wall surface and tackboard panels and press panels to wall surface. Install panels to the wall surface in one piece from floor to ceiling or extent as indicated on drawings. Install panels plumb and level to fit snugly to the walls so that there is no movement when pressure is applied at any surface point.

- C. All vertical joints shall be butt joints with machine wrapped vinyl fabric around edge of fiberboard.
- D. Joint Layout: Locate as indicated. Where not indicated, no panel width shall be less than 18-inches wide.
- E. Align faces carefully to provide a plane surface, plumb, level and true.
- F. Install panels in one piece beginning at center point of the wall and working to room corners.
- G. Install tack board panels in exact order as they are manufactured from the vinyl covering bolt.
- H. Install vinyl covered tack panels in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other panels, field fabricated to fit adjoining work accurately at the borders and wall penetrations.
- I. Metal Trim: Use maximum lengths possible. Install trim at all exterior corners, interior corners, all locations where panels abut other materials, and at locations where indicated. Stop vertical trim at top of rubber base.

3.2 CLEANING AND COMPLETION

- A. Clean tack board panels upon completion of installation to remove any foreign materials or adhesive in accordance with fabric cleaning instructions.
- B. Upon completion of the work, remove surplus materials, rubbish and debris resulting from the tackboard panel installation. Leave areas in neat clean and orderly condition.

END OF SECTION

06/06/18

SECTION 09 84 33

SOUND-ABSORBING WALL UNITS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes shop-fabricated, acoustical panel units tested for acoustical performance, including the following:
 - 1. Sound-absorbing wall panels.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Requirements:
 - 1. Section 09 77 23 "Fabric-Covered Tack Paneling" for decorative, fabric-wrapped wall panels that are not required to be tested for acoustical performance.

1.2 REFERENCES

- A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

ASTM International (ASTM)
General Services Administration Federal Specifications (Fed. Spec.)

1.3 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include fabric facing, panel edge, core material, and mounting indicated.
- B. Shop Drawings: For unit assembly and installation.
 - 1. Include plans, elevations, sections, and mounting devices and details.
 - 2. Include details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge profile and core materials.
 - 3. Include details at cutouts and penetrations for other work.
 - 4. Include direction of fabric weave and pattern matching.
- C. Samples for Initial Selection: Submit 2 fabric selector cards from manufacturer's standard finishes.
- D. Samples for Verification: For the following products:

1. Panel Edge: 12-inch long Sample(s) showing each edge profile, corner, and finish.
2. Core Material: 12-inch square Sample at corner.
3. Mounting Devices: Full-size Samples.
4. Assembled Panels: Approximately 12 by 12 inches, including joints and mounting methods.

E. Submittal procedures and quantities are specified in Section 01 33 00.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of unit.
- B. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of unit to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal instructions.

1.7 QUALITY ASSURANCE:

- A. Manufacturer Qualifications: A firm continuously involved in the fabrication of specialty acoustical fabric panel systems for at least 5 years immediately before this contract.
- B. Installer Qualifications: An installer approved by the manufacturer of the materials specified and thoroughly experienced in this type of work.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Air-Quality Limitations: Protect units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.
- C. Field Measurements: Verify unit locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

1.10 WARRANTY

- A. Section 01 78 36 – Warranties: Requirements for warranties.

- B. Special Warranty: Manufacturer agrees to repair or replace units and components that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to the following:
 - a. Acoustical performance.
 - b. Fabric sagging, distorting, or releasing from panel edge.
 - c. Warping of core.
2. Warranty Period: Three (3) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain wall units specified in this Section from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: Units shall comply with "Surface-Burning Characteristics" Subparagraph below, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.

2.3 SOUND-ABSORBING WALL UNITS

- A. Sound-Absorbing Wall Panel (Drawing Designation AP and AP1): Manufacturer's standard panel construction consisting of facing material laminated to front face, edges, and back edge border of core.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Decoustics Limited; a Saint Gobain company; www.decoustics.com; H.I.R. #1 (High Impact Resistant/Tackable) Acoustic Panel.
 - b. Lamvin, Inc.; www.lamvin.com; Tackable High-Impact Acoustical Wall & Ceiling Panels.
 - c. Wall Technology, Inc.; an Owens Corning company; www.walltechnology.com; IRI08 Series Acoustical Panels
2. Panel Shape: Flat.
3. Mounting: Back mounted with manufacturer's standard metal clips or bar hangers, secured to substrate.
4. Core Material: Manufacturer's rigid glass fiber board having a density of not less than 7 pounds per cubic foot, fabricated in factory molds.

- a. Core-Face Layer: Manufacturer's standard impact-resistant, acoustically transparent, copolymer sheet; completely adhered to the face of the panel and returned to the back for a full finished edge.
- 5. Edge Construction: Manufacturer's standard chemically hardened core with no frame.
- 6. Edge Profile: Bullnose.
- 7. Corner Detail in Elevation: Square with continuous edge profile indicated.
- 8. Facing Material: Woven polyester or modacrylic/polyester blend, 17 by 17 or 18 by 17 weave, weighing not less than 16.5 ounces per linear yard. Stretch wrap and bond fabric to the sides and back of the core material.
 - a. Patterns and colors: As selected by Architect from manufacturer's standard patterns and colors.
- 9. Acoustical Performance:
 - a. Sound absorption for 1-1/8" thickness: NRC 0.85 to 0.95.
 - b. Sound absorption for 2-1/8" thickness: NRC 0.95 to 1.10.
 - c. NRC listings are according to ASTM C 423 for a Type D mounting.
- 10. Nominal Overall Panel Thickness:
 - a. Panel AP: 1-1/8 inch at small Music Rooms.
 - b. Panel AP2: 2-1/8 inch at large Music Rooms.
- 11. Panel Width: As indicated on Drawings.
- 12. Panel Height: As indicated on Drawings.

2.4 MATERIALS

- A. Core Materials: Manufacturer's standard.
 - 1. Glass-Fiber Board: ASTM C 612; of type standard with manufacturer; nominal density of 6 to 7 lb/cu. ft. unfaced, and dimensionally stable, molded rigid board; and with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
 - 2. Impact-Resistant, Acoustically Transparent, Copolymer Sheet for Face Layer: 1/16- to 1/8-inch thick layer of perforated, noncombustible, copolymer sheet laminated to face of core.
- B. Facing Material: As selected by Architect from manufacturer's full range.
- C. Mounting Devices: Concealed on back of unit, recommended by manufacturer to support weight of unit, and as follows:
 - 1. Adhesives: As recommended by unit manufacturer and with a VOC content of 70 g/L or less.
 - 2. Metal Clips or Bar Hangers: Manufacturer's standard two-part metal "Z" clips, with one part of each clip mechanically attached to back of unit and the other part to substrate, designed to permit unit removal.

2.5 FABRICATION

- A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.
- B. Edge Hardening: For glass-fiber board cores, chemically harden core edges and areas of core where mounting devices are attached.
- C. Core-Face Layer: Evenly stretched over core face and edges and securely attached to core; free from puckers, ripples, wrinkles, or sags.
- D. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
 - 1. Square Corners: Tailor corners. Heat-seal vinyl fabric seams at corners.
- E. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:
 - 1. Thickness.
 - 2. Edge straightness.
 - 3. Overall length and width.
 - 4. Squareness from corner to corner.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabric, fabricated units, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting unit performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install units in locations indicated. Unless otherwise indicated, install units with vertical surfaces and edges plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.
- C. Place units symmetrically about centerlines or as otherwise indicated. Install with joints true and straight and junctures with ceilings, walls and openings neat and tight. Completed work shall present a smooth plane and level surface, free from unevenness, edge or corner offsets, cupping, scratches and other imperfections.
- D. Fit border units neatly and tightly against abutting surfaces. Replace loose and damaged panels when directed. Leave surface clean and free from marking and other disfigurement.
- E. Align fabric pattern and grain with adjacent units.

3.3 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION

06/08/18

SECTION 09 91 00

PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Furnishing of materials and equipment and completion of painting and painter's finish on exposed exterior and interior surfaces as required to complete the painting and finishing as indicated and specified.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Requirements:
 - 1. Section 05 12 00 "Structural Steel Framing" for shop priming of metal substrates.
 - 2. Section 05 50 00 "Metal Fabrications" for shop priming metal fabrications.

1.2 DEFINITIONS

- A. Blocking: Two painted surfaces sticking together such as a painted door sticking to a painted jamb.
- B. PDCA: Painting & Decorating Contractors of America www.pdca.org.
- C. SSPC: Scopes of SSPC Surface Preparation Standards and Specifications. www.sspc.org.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples: Prepare samples of colors and textures based upon the Architect's selections and submit them for review.
 - 1. Painted Wall Samples: Prepare on 8" by 10" matt board in a stair step manner so all required coats show.
 - 2. Painted Wood Samples: Prepare on clear Douglas fir or pine 1" by 4" by 12" long strips, arranged in a stair step manner so all required coats show.
- C. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.
- D. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

- B. Quantity: Furnish Owner with an additional 3 percent, but not less than one gallon of each material and color applied.

1.4 QUALITY ASSURANCE

- A. The intent and requirements of this section, is that materials, items and surfaces which are normally painted and finished in construction of this type and quality, shall be so included, whether or not said materials, items or surfaces are specifically called out and included in the schedules and notes on the drawings, or is, or is not, specifically mentioned in these specifications.
- B. The following general categories of construction and items are included under other sections, and shall not be a part of this section:
 - 1. Shop prime painting of structural and miscellaneous iron or steel.
 - 2. Shop prime painting of hollow metal.
 - 3. Shop finished construction and items.
- C. Paint exposed mechanical, plumbing and electrical construction, which is not factory finished.
- D. The Room Finish Schedules indicated, show the location of interior room surfaces to be painted or finished. The schedule indications are general and do not necessarily define the detail requirements. Include detailed refinements and further instructions as may be given for the required complete finishing of spaces and rooms.
- E. Regulatory Requirements. The quantity of volatile organic compounds (VOC) used in paint products shall not exceed the limits permitted under the current regulations for architectural coatings of the Bay Area Air Quality Management District.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Delivery:
 - 1. Deliver paint in manufacturer's labeled and sealed containers. Labels shall include manufacturer's name, brand, type, batch number, color of paint and instructions for reducing. Thin only in accordance with printed directions of manufacturer. Thinning shall comply with the regulations of the air pollution control district having jurisdiction.
 - 2. Do not deliver or use materials other than those specified, or approved.
- B. Storage and Handling: Store paint materials and equipment, when not in actual use, in places specifically assigned for that purpose. Ventilate storage space and provide fire protection. Mix and handle paint in these assigned areas; use metal containers for mixing and handling and designed for safety. Remove paint materials, including rags, tarpaulins, mixers, and empty containers and filled or partially filled containers from the building areas at the close of each working day.

1.6 FIELD CONDITIONS

- A. Environmental Requirements:
 - 1. Exterior Surfaces: Do not apply exterior paint in damp, rainy weather or until the surface has dried thoroughly from the effects of such weather. Do not apply transparent finishes or paint when temperature is below 50 degrees F. Avoid painting surfaces when exposed to hot sunlight.

2. Interior Surfaces: In enclosed spaces, perform the application and drying of paint only when the temperature is 65 degrees F or above and maintained constantly to prevent condensation.
- B. Examine the drawings and the specifications of other trades and consult with the other trades to determine the full extent of surfaces and items that are specified to include shop priming and shop finish painting.

1.7 WARRANTY

- A. Provide an extended warranty under the provisions of Section 01 78 36.
- B. Warrant painting and finishing against peeling, fading, cracking, blistering, or crazing for a period of 2 years from the date of "Substantial Completion". The written warranty shall include materials and labor. The warranty shall be signed by the paint manufacturer, the painter and the Contractor.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Products: Subject to compliance with requirements, provide products listed from one of the following manufacturers for the paint category indicated.
 1. Benjamin Moore.
 2. Dunn-Edwards Corp.
 3. PPG Paints.
 4. Kelly-Moore Paint Co.
 5. Sherwin-Williams Co.
- B. Primer and sealer coats may be thinned no more than 10 percent, with paint manufacturer's thinner. Use other materials as they come from the can, except as otherwise approved.
- C. Secure the Color Schedule before undercoating. Unless otherwise specified, tint undercoats slightly to approximate the color of the finish coat. Obtain approval of colors before proceeding with the finishing operations.
- D. Where a specific name is not given for a product or ingredient, provide item of the best quality of the approved manufacturer, which is normally used for the intended purpose.

2.2 PAINT, GENERAL

- A. Material Compatibility:
 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- C. Colorants: The use of colorants containing hazardous chemicals, such as ethylene glycol, is prohibited.

2.3 COLOR SELECTION

- A. The Architect will select the finish colors and determine the basic hues of all surfaces to be painted or finished.
- B. Colors: Custom colors as selected by the Architect.
- C. After the actual painting and finishing has started, the Architect retains the right to make minor modifications in tone and shade on the various surfaces to suit the actual lighting conditions encountered. Submit additional samples, as required, to assist the Architect in his final selection.
- D. The number of colors to be used in any given room or space, and on the entire project, will be determined by the Architect.

2.4 MATERIALS

- A. Substitutions: Materials will be considered for substitution subject to requirements specified in Section 01 25 13. Submit chemical formulations of materials proposed for substitution to demonstrate that formulation of substitution is similar to formulation of specified product; or results of test showing that performance of substitution is equivalent to performance of specified product.
- B. Acceptable Products: Unless otherwise specified in the Paint Schedule, acceptable products include the following or equal:

- 1. Galvanized Metal Primer:

- Benjamin-Moore; P04 Acrylic Metal Primer
 - Dunn-Edwards Corp.; UGPR00 Ultra-Grip
 - PPG PAINTS; 4020 Pitt Tech Plus (91 g/L VOC)
 - Kelly-Moore Paint Co.; 5725 DTM Acrylic Primer/Finish
 - Sherwin-Williams Co.; B66 Pro Industrial Pro-Cryl Universal Acrylic Primer

- 2. Ferrous Metal Primer:

- Benjamin-Moore; P04 Acrylic Metal Primer
 - Dunn-Edwards Corp.; BRPR00-1 Bloc-Rust
 - PPG PAINTS; 4020 Pitt Tech Plus (91 g/L VOC)
 - Kelly-Moore Paint Co.; 5725 DTM Acrylic Primer/Finish
 - Sherwin-Williams Co.; Pro Industrial ProCryl Universal Metal Primer B66-310

- 3. Aluminum Primer:

- Benjamin-Moore; P04 Acrylic Metal Primer
 - Dunn-Edwards Corp.; ULGM00, Ultrashield, Int./Ext. Galvanized Metal Primer
 - PPG PAINTS; 4020 Pitt Tech Plus (91 g/L VOC)
 - Kelly-Moore Paint Co.; 5725 DTM Acrylic Primer Finish
 - Sherwin-Williams Co.; Pro Industrial ProCryl Universal Metal Primer B66-310

4. Wood Primer - Exterior:

Benjamin-Moore; 166 Superspec Busan 100% Acrylic Exterior Primer
Dunn-Edwards Corp.; EZPR00 E-Z Prime
PPG Paints; 3210 Gripper (90.3 g/L VOC)
Kelly-Moore Paint Co.; 255 Acry-Shield Exterior Wood Primer
Sherwin-Williams Co.; Ext Latex Wood Primer B42W8041

5. Concrete and Plaster Primer - Exterior:

Benjamin-Moore; 066 Acrylic Masonry Sealer
Dunn-Edwards Corp.; ESPR00 Eff-Stop
PPG Paints; 6001 Hydro-Sealer (86.4 g/L VOC)
Kelly-Moore Paint Co.; 247 Acry-Shield 100% Acrylic Masonry Primer
Sherwin-Williams Co.; Loxon Exterior Acrylic Masonry Primer A24 Series

6. Intermediate Metal Undercoat - Exterior:

Benjamin-Moore; P04 Acrylic Metal Primer
Dunn Edwards: N/A
PPG PAINTS; 4020 Pitt Tech Plus (91 g/L VOC)
Kelly-Moore Paint Co.; 5725 DTM Acrylic Primer/Finish
Sherwin-Williams Co.; Pro Industrial ProCryl Universal Metal Primer B66-310

7. Acrylic Enamel Undercoat - Interior:

Benjamin-Moore; 253 Moorcraft Superspec Latex Enamel Undercoat
Dunn-Edwards Corp.; IKPR00 Interkote
PPG Paints; 1000 Prep & Prime Enamel Undercoater (92.6 g/L VOC)
Kelly-Moore Paint Co.; 973 Acry-Plex ZERO VOC Interior Wall Primer Undercoat
Sherwin-Williams Co.; ProMar 200 Zero VOC Primer B282600

8. Vinyl Acrylic Sealer:

Benjamin-Moore; 534 Ultra Spec 500 Interior Latex Primer
Dunn-Edwards Corp.; VNPR00 Vinylastic
PPG Paints; 1000 Hi Hide Interior Primer Sealer (92.6 g/L VOC)
Kelly-Moore Paint Co.; 971 Acry-Plex Low VOC Interior PVA Primer/Sealer
Sherwin-Williams Co.; Premium Wall & Wood Primer B28

9. Acrylic Gloss Enamel

Benjamin-Moore; Ultra Spec EXT 449 Gloss Finish
Dunn-Edwards Corp.; EVSH60 Evershield Gloss
PPG PAINTS; 3028N Ultra-Hide 250 Int/Ext Gloss Enamel (34 g/L VOC)
Kelly-Moore Paint Co.; Devcryn 1449 Waterborne Gloss
Sherwin-Williams Co.; A-100 Acrylic Gloss A8 Series

10. Wood Trim Enamel - Semi-Gloss:

Benjamin-Moore; 448 Ultra Spec EXT Satin Finish
Dunn-Edwards Corp.; EVSH50 Evershield Semi-Gloss / SSSL50 Spartashield
PPG PAINTS; 2406XI Fortis 350 Semi-Gloss (41.63 g/L VOC)
Kelly-Moore Paint Co.; 1215 Premium Professional Exterior 100% Acrylic Semi-Gloss
Sherwin-Williams Co.; A-100 Exterior Latex Gloss A8 Series

11. Acrylic Finish Coat - Flat - Exterior:

Benjamin-Moore; 447 Ultra Spec EXT Flat Finish
Dunn-Edwards Corp.; EVSH10 Evershield Flat / SSSL10 Spartashield Flat
PPG PAINTS; 2200XI Fortis 350 Exterior Flat (49.25 g/L VOC)
Kelly-Moore Paint Co.; 1200 Premium Professional Exterior 100% Acrylic Flat
Sherwin-Williams Co.; A-100 Exterior Latex A6

12. Acrylic Enamel-Non Blocking - Low Sheen - Interior:

Benjamin-Moore; Advance Satin Waterborne Alkyd 792
Dunn-Edwards Corp.; SPMA40 Suprema Low Sheen
PPG Paints; 1402N Ultra Hide-250Non-Blocking Eggshell (50 g/L VOC)
Kelly-Moore Paint Co.; 1610 Acry-Plex 100% Acrylic Eggshell Enamel
Sherwin-Williams Co.; Pro Industrial Waterbased Alkyd Urethane Enamel B53

13. Acrylic Latex Enamel - Semi-Gloss - Interior:

Benjamin-Moore; 539 Ultra Spec 500 Semi-Gloss
Dunn-Edwards Corp.; SPMA50 Suprema Semi-Gloss / SZRO50 SpartaZero
PPG Paints; 6-4510 Speedhide Zero Semi-Gloss Enamel (Zero VOC)
Kelly-Moore Paint Co.; 1050 Premium Professional Semi-Gloss Enamel
Sherwin-Williams Co.; Pro Industrial Waterbased Alkyd Urethane Enamel B53

14. Acrylic Enamel-Non Blocking - Semi-Gloss - Interior:

Benjamin-Moore; EcoSpec W/B Semi Gloss 376
Dunn-Edwards Corp.; EVSH50 Evershield Semi-Gloss
PPG Paints; 1406N Ultra Hide-250 Non-Blocking Semi-Gloss (50 g/L VOC)
Kelly-Moore Paint Co.; 1650 Acry-Plex 100% Acrylic Semi-Gloss Enamel
Sherwin-Williams Co.; Solo Semi Gloss A76W0051

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMU): 12 percent.
 - 3. Wood: 15 percent.
 - 4. Portland Cement Plaster: 12 percent.
 - 5. Gypsum Board: 12 percent.
- C. Portland Cement Plaster Substrates: Verify that plaster is fully cured, including pH testing to determine that alkalinity is within limits established by the manufacturer.
- D. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- E. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

- F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- G. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions, including pH testing to determine that alkalinity is within limits established by the manufacturer.
- E. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:
 - 1. SSPC-SP 1, "Solvent Cleaning."
 - 2. SSPC-SP 2, "Hand Tool Cleaning."
 - 3. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- G. Galvanized-Metal Substrates:
 - 1. Clean all galvanized metal with an appropriate Metal Prep and Passivator Remover.
 - 2. To ensure passivators removal, perform the following test:
 - a. With a 2% to 5% copper sulfate solution, place a swab or droplets on the prepared area. If the copper sulfate causes the galvanized to blacken, passivator has been removed and is ready for paint applications.
 - b. If the copper sulfate has no effect on the galvanized, continue with metal prep solution OR use a Scotch Pad to abrade it being careful not to remove the galvanization itself.
 - 3. Then apply required primer, allow drying as described in the product data sheets and test adhesion prior to applying finish coat(s).
- H. Aluminum Substrates: Remove loose surface oxidation.
- I. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.

2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
 1. Use applicators and techniques suited for paint and substrate indicated.
 2. The number of coats scheduled is the minimum number of coats required. Additional coat(s) shall be applied at no additional cost to the Owner, to completely hide base material, provide uniform color, and to produce satisfactory finish results.
 3. Apply coatings without thinning except as specifically required by label directions, or required by these specifications. In such cases, thinning shall be the minimum reduction permitted.
 4. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 5. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 6. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 7. Priming may not be required on items delivered with prime or shop coats, unless otherwise specified. Touch up prime coats applied by others as required ensuring an even primed surface before applying finish coat.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 1. Paint the following work where exposed to view:
 - a. Equipment, including panelboards and switch gear.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Tanks that do not have factory-applied final finishes.
 2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 PAINTING SCHEDULE

A. Exterior Surfaces:

- 1. Galvanized Metals - Gloss: (Galvanized surfaces exposed to sight and/or weather, unless indicated to be unpainted).

1 coat Galvanized Metal Primer
2 coats Acrylic Gloss Enamel
- 2. Iron and Steel - Gloss: (All other iron and steel surfaces exposed to sight and/or weather).

2 coats Ferrous Metal Primer*
1 coat Intermediate Metal Undercoat - Exterior
1 coat Acrylic Gloss Enamel

*Omit first coat on shop-primed surfaces.
- 3. Aluminum - Gloss: (All surfaces not indicated or specified to receive factory finish).

1 coat Aluminum Primer
1 coat Intermediate Metal Undercoat - Exterior
1 coat Acrylic Gloss Enamel
- 4. Wood - Painted Semi-Gloss:

1 coat Wood Primer - Exterior
2 coats Wood Trim Enamel - Semi-Gloss
- 5. Concrete - Painted Flat:

1 coat Concrete and Plaster Primer - Exterior
1 coat Acrylic Finish Coat - Flat - Exterior
- 6. Integrally Colored Cement Plaster:

1 coat Concrete and Plaster Primer - Exterior
1 coat Acrylic Finish Coat - Flat - Exterior

B. Interior Surfaces:

- 1. Steel Door Frames - Non-Blocking Semi-Gloss:

1 coat Ferrous Metal Primer*
1 coat Acrylic Enamel Undercoat - Interior
1 coat Acrylic Enamel-Non Blocking - Semi-Gloss - Interior

*Omit 1st coat on shop-primed surfaces.

2. Metals - Acrylic Latex Enamel Semi-Gloss: (All other metals Including exposed piping, conduit, electrical panels, miscellaneous brackets, bolts, fasteners, supports, prime coated hardware, casing beads, metal grilles and exposed ducts etc., other than plated or factory finished items).

1 coat Ferrous Metal Primer*
1 coat Acrylic Enamel Undercoat - Interior
1 coat Acrylic Latex Enamel - Semi-Gloss - Interior

*Omit 1st coat on shop-primed surfaces.

3. Gypsum Board - Low Sheen:

1 coat Vinyl Acrylic Sealer
1 coat Acrylic Enamel Undercoat - Interior
1 coat Acrylic Enamel-Non Blocking - Low Sheen - Interior

4. Gypsum Board - Acrylic Latex Enamel Semi-Gloss:

1 coat Vinyl Acrylic Sealer
1 coat Acrylic Enamel Undercoat - Interior
1 coat Acrylic Latex Enamel - Semi-Gloss - Interior

5. Wood Doors - Non-Blocking Semi-Gloss:

1 coat Acrylic Enamel Undercoat - Interior
1 coat Acrylic Enamel-Non Blocking - Semi-Gloss - Interior

6. Wood - Acrylic Latex Enamel - Semi-Gloss:

1 coat Acrylic Enamel Undercoat - Interior
2 coats Acrylic Latex Enamel - Semi-Gloss - Interior

7. Miscellaneous: Construction visible through screen vents and grilles shall have one heavy coat of flat black paint.

END OF SECTION

06/06/18

SECTION 10 11 00

VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Porcelain enamel markerboards.
2. Aluminum trim and accessories.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Sections:

1. Section 09 77 23 – Fabric Covered Tack Paneling.

1.2 REFERENCES

A. The editions of standards and specifications published by the following organizations, and referenced herein, apply to the work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

Aluminum Association (AA)
American Society for Testing and Materials (ASTM)
American National Standards Institute (ANSI)
U.S. General Services Administration (Fed. Spec.)

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and accessories for visual display units.

B. Shop Drawings: For visual display units.

1. Include plans, elevations, sections, details, and attachment to other work.
2. Show locations of panel joints. Show locations of field-assembled joints for factory-fabricated units too large to ship in one piece.
3. Include sections of typical trim members.

C. Samples: Submit full range of color samples for each type of markerboard, trim and accessory required. Provide 12-inch square samples of sheet materials and fabric swatches and 12-inch lengths of trim members for color verification after selections have been made.

D. Product Schedule: Submit schedule of visual display units. Use same designation indicated on Drawings.

E. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 INFORMATION SUBMITTALS

- A. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For visual display units, to include in maintenance manuals.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Wrap or otherwise package markerboard and tackboard components for protection against damage during shipment and storage. Store components in a clean, dry storage area as packaged by the manufacturer, with manufacturer's seals and labels intact. Store porcelain enameled steel markerboard panels on edge in a manner to prevent bowing, warping or other irregularities.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install visual display units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Verify actual dimensions of construction contiguous with visual display units by field measurements before fabrication.
 - 1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

1.8 WARRANTY

- A. Provide an extended warranty under the provisions of Section 01 78 36.
- B. Submit a written warranty executed by manufacturer agreeing to replace porcelain enamel markerboards that do not retain their original writing and erasing qualities, become slick and shiny, or exhibit crazing, cracking, or flaking within the specified warranty period, provided the manufacturer's written instructions for handling, installation, protection, and maintenance have been followed.
 - 1. Warranty Period: "Life of Building" warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufacturers or equal:

Claridge Products and Equipment, Inc.; www.claridgeproducts.com
Platinum Visual Systems™; www.pvsusa.com
Chatfield-Clarke Co., Inc.; www.chatfield-clarke.com
Newline Products, Inc.; www.newlineproduct.com

2.2 VISUAL DISPLAY BOARD ASSEMBLY

- A. Visual Display Board Assembly: Factory fabricated.
 - 1. Assembly: Markerboard.
 - 2. Corners: Square.
 - 3. Width: As indicated on Drawings.
 - 4. Height: As indicated on Drawings.
- B. Markerboard Panel: Porcelain-enamel faced markerboard panel on core indicated.
 - 1. Color: As selected by Architect.
- C. Aluminum Frames and Trim: As specified in Article 2.5.

2.3 MARKERBOARD PANELS

- A. Porcelain Enamel Markerboard Panels: Balanced, high pressure, factory-laminated markerboard assembly of three-ply construction; consisting of moisture-barrier backing, core material, and porcelain-enamel face sheet with low-gloss finish. Laminate panels under heat and pressure with manufacturer's standard, flexible waterproof adhesive.
- B. Face Sheet: ASTM A424, enameling grade steel sheet coated on exposed face with 3 coat process of primer, ground coat and color cover coat, and on concealed face with 2 coat process of primer and ground coat. Fuse cover and ground coats to steel at firing temperatures standard with manufacturer, but not less than 1200 degrees F.
 - 1. Finish: Low gloss finish for use with dry-erase markers that wipe clean with dry cloth or standard eraser, and that is suitable as a projection screen.
 - 2. Proprietary Facing Sheet: At Contractor's option, "Writanium®" 28 gauge steel face with porcelain enamel finish by Platinum Visual Systems; or "LCS-II" porcelain enamel clad, Type 1 stretcher-leveled aluminized steel face sheet, by Claridge Products and Equipment, Inc. may be provided in lieu of facing sheet construction specified above. Fuse porcelain enamel coating to steel at approximately 1000 degrees F (538 degrees C).
 - 3. Facing Sheet Thickness: 24-gage.
 - 4. Cover Coat Finish: Special writing surface with gloss finish intended for use with manufacturer recommended fast drying liquid felt-tipped markers. Color: As selected by Architect.
- C. Core: Particleboard complying with ANSI A208.1-1989, Grade 1-M-1, nominal 1/2-inch thick.
- D. Backing Sheet: Aluminum sheet, 0.005-inch thick.
- E. Laminating Adhesive: Manufacturer's standard moisture resistant thermoplastic type.

2.4 ALUMINUM TRIM AND ACCESSORIES

- A. Fabricate frames and trim of not less than 0.062 inch thick, 6063-T5 alloy aluminum extrusions. Provide trim in straight single lengths wherever possible, keep joints to a minimum. Miter corners to a neat, hairline closure.
 - 1. Finish: Clear anodized finish meeting the requirements of AA designation M12C22A31.
- B. Field Applied Trim: Manufacturer's standard slip-on trim.
- C. Chalktray: Manufacturer's standard ribbed section, solid extrusion with exposed ends smoothly curved. Provide chalktray under all markerboards and tackboards.
- D. Map Rails: Integral part of top edge angle, continuous at top of all markerboards and tackboards. Provide the following accessories:
 - 1. Display Rail: Continuous 1-inch wide cork display rail integral with map rail.
 - 2. End Stops: One at each end of each map rail.
 - 3. Map Hooks with Flexible Metal Clips: Two for each 4 foot of map rail or fraction thereof.
 - 4. Roller Shade Brackets: Two for each 4 foot of map rail or fraction thereof.
 - 5. Flagholder: One for each room.

2.5 FASTENERS

- A. Anchors for attachment of visual display units at CMU walls: Hilti Screw Anchor Kwik HUS-EZ, size as shown on drawings.
 - 1. Approvals: ICC ESR-3056 for Kwik HUS-EZ Screw Anchors in Masonry.

2.6 FABRICATION

- A. Assembly: Provide either factory-assembled or field-assembled markerboard and tackboard units.
- B. Make joints only where total length exceeds maximum manufactured length. Fabricate with the minimum number of joints, balanced around the center of the board, as acceptable to the Architect.
- C. Splice rails shall be manufacturer's standard "H" sections designed to receive and lap board on both edges along vertical butt joints. Exposed face of splice rail shall be colored to match adjacent board. No butt joints will be permitted in boards less than 16 feet in length.
- D. Provide manufacturer's standard mullion trim at joints between markerboards and tackboards.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. 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.

2.8 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
- B. Examine walls and partitions for proper preparation and backing for visual display units.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair the performance of and affect the smooth, finished surfaces of visual display boards, including dirt, mold, and mildew.
- C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display units and wall surfaces.
- D. Prepare recesses for sliding visual display units as required by type and size of unit.

3.3 INSTALLATION

- A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- B. Factory-Assembled Units: Deliver factory-assembled markerboard and tackboard units completely assembled in one piece without joints, wherever possible. Where dimensions exceed panel size, provide 2 or more pieces of equal length as acceptable to the Architect. When overall dimensions require delivery in separate units, prefabricate components at the factory, disassemble for delivery, and make final joints at the project site. Use splines at joints to maintain surface alignment.
- C. Field Assembled Units: Install plumb and level directly to wall surface, with full aluminum surround trim, chalk tray, fastenings and all related accessories. Check for surface

movement under hand pressure and reinstall board if movement occurs. No markerboard joints will be allowed unless the board is over 12 feet long.

- D. Install units in accordance with manufacturer's instructions. Keep perimeter lines straight, plumb, and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for a complete installation.
- E. Aluminum Trim: Provide neat, tightly closed, bend-around mitered corners, spliced only if over 16 foot lengths, with no single piece less than 4 feet in length. Fasten to walls with concealed fasteners as recommended by the manufacturer.

3.4 CLEANING AND PROTECTION

- A. Clean visual display units according to manufacturer's written instructions. Attach one cleaning label to visual display surface in each room.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.
- C. Cover and protect visual display units after installation and cleaning.

END OF SECTION

06/06/18

SECTION 10 14 00

SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior and interior room identification signs.
2. Exterior and interior directional, informational, and safety signs.
3. Parking signs.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 DEFINITIONS

A. Accessible: In accordance with the accessibility standard referenced in paragraph 1.6.A.

1.3 ACTION SUBMITTALS

A. Product Data: Submit product data for specified products. Include material details for each sign specified.

B. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including dimensions, anchorage, and accessories.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign.

C. Samples: One sample of each type of sign. Each sample shall consist of a complete sign panel with letters and symbols. Samples may be installed in the work, provided each sample is identified and location recorded. Two samples of manufacturer's standard color chips or color chart for each material requiring color selection.

D. Installation: Submit manufacturer's installation instructions

E. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals. Include precautions against harmful cleaning materials and methods.

- B. Submit warranty documents specified herein.

1.6 REGULATORY REQUIREMENTS

- A. Requirements for Physically Disabled: Provide identifying devices meeting the 2010 ADA Standards for Accessible Design, and 2016 California Building Code (CBC) Title 24 Part 2; Chapter 11B, Division 7 - Communication Elements and Features, with ANSI 2012 Supplement, and sections as follows:

1. Signs, General: Section 11B-703.1.
2. Raised Characters shall comply with CBC Section 11B-703.2:
 - a. Depth: Depth shall be 1/32 inch minimum above their background and shall be sans serif uppercase and be duplicated in Braille.
 - b. Height: Height shall be 5/8 inch minimum and 2 inches maximum based on the height of the uppercase letter "I". CBC Section 11B-703.2.5
 - c. Finish and Contrast: Characters and their background shall have a non-glare finish. Character shall contrast with their background with either light characters on a dark background or dark characters on a light background. CBC Section 11B-703.5.1
 - d. Proportions: Proportions shall be selected from fonts where the width of the uppercase letter "O" is 60% minimum and 110% maximum of the height of the uppercase letter "I". Stroke thickness of the uppercase letter "I" shall be 15% maximum of the height of the character. CBC Sections 11B-703.2.4 and 11B-703.2.6
 - e. Character Spacing: Spacing between individual raised characters shall comply with CBC Section 11B-703.2.7 and 11B-703.2.8
 - f. Format: Text shall be in a horizontal format. CBC Section 11B-703.2.9
 - g. Braille: Braille shall be California Contracted (Grade 2) and shall comply with CBC Sections 11B-703.3 and 11B-703.4. Braille dots shall have a domed or rounded shape and shall comply with CBC Table and Figure 11B-703.3.1.
 - h. Mounting Height: Tactile characters on signs shall be located 48" minimum to the baseline of the lowest Braille cells and 60" maximum to the baseline of the highest line of raised characters above the finish floor or ground surface. CBC Section and Figure 11B-703.4.1
 - i. Mounting Location: A tactile sign shall be located per CBC Section and Figure 11B-703.4.2 as follows:
 - 1) alongside a single door at the latch side.
 - 2) on the inactive leaf at double doors with one active leaf.
 - 3) to the right of the right hand door at double doors with two active leaves.
 - 4) on the nearest adjacent wall where there is no wall space at the latch side of a single door or at the right side of double doors with two active leaves.
 - 5) so that a clear floor space of 18" x18" minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45 degree open position.
3. Visual characters shall comply with CBC Section 11B-703.5 and shall be 40" minimum above finish floor or ground.
4. Pictograms shall comply with CBC Section 11B-703.6.
5. Symbols of accessibility shall comply with CBC Section 11B-703.7.
 - a. Finish and Contrast: Section 11B-703.7.1.
 - b. Symbols: Section 11B-703.7.2.
 - 1) International Symbol of Accessibility: Section 11B-703.7.2.1.
 - 2) Assistive Listening Systems: Section 11B-703.7.2.4.
 - 3) Toilet Facilities Geometric Symbols: Section 11B-703.7.2.6.
6. Variable message signs shall comply with CBC Section 11B-703.8.

- B. Braille Symbols: California Grade 2 braille shall be used wherever braille symbols are specifically required. Dots shall be 1/10-inch (2.5 mm) on center in the same cell with 3/10-inch space between cells measured between the second column of dots in the first cell to the first column of dots in the adjacent cell. Dots shall be domed or rounded profile, and raised a minimum of 1/40-inch above the background. Comply with CBC Table 11B-703.3.1 - Braille Dimensions.
- C. Inspection: Signs and identification devices shall be field inspected after installation and approved by the enforcing agency prior to the issuance of a final certificate of occupancy per 2016 CBC, Chapter 1, Division II, Section 111, or final approval where no certificate of occupancy is issued. The inspection shall include, but not be limited to, verification that Braille dots and cells are properly spaced and the size, proportion and type of raised characters are in compliance with these regulations. CBC Section 11B-703.1.1.2.

1.7 DELIVERY AND STORAGE

- A. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- B. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Store products protected from weather, temperature, and other harmful conditions as recommended by supplier.
- D. Handle products in accordance with manufacturer's instructions.

1.8 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace signage that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS – EXTERIOR PLAQUE SIGNS

- A. Sign finish shall comply with the following performance requirements:
 - 1. Weatherability: When tested in accordance with ASTM G 53, after 500 hours in a Weatherometer (equivalent to approximately 3 years exterior exposure):
 - a. Gloss retention not less than 88.0 determined in accordance with ASTM D 523 at a 60 degree angle.
 - b. Color shall not change more than 1.68 units determined in accordance with ASTM D 2244 and measured with a Hunter Colorimeter, Model D25.
 - 2. Durability: Sign finish shall show no effect after repeated use of cleaners such as Graffiti Remover #1120 manufactured by Fine Organics Corp., Lodi, NJ.

2.2 SIGNAGE SYSTEMS

- A. Acceptable manufacturers or equal:

ASI Sign Systems; www.asisignage.com

Accent Signage Systems; www.accentssignage.com
Advance Corporation; www.advancecorp.com
Ellis & Ellis Sign Systems; www.ellissigns.com
Mohawk Sign Systems, Inc.®; www.mohawksign.com
Weidner Architectural Signage; www.weidnerca.com
Substitutions: Section 01 25 13 "Product Options and Substitutions."

B. Interior Plaque Signs: Acceptable product or equal:

Basis-of-Design Product: ASI Sign Systems; www.asisignage.com; Model: InForm Plaque Signs.

1. Sign Types: As shown on drawings.

C. Exterior Plaque Signs: Acceptable product or equal:

Basis-of-Design Product: Advance Corporation, Braille-Tac™ Division;
www.advancecorp.com; Model: Braille-Tac™ Chemcast™ (etched magnesium) sign systems.

1. Sign Types: As shown on drawings.

2.3 MATERIALS

A. Aluminum Alloy Products:

1. Sheet or Plate, ASTM B209, alloy selected to meet the structural requirements of the specific application. Surface finish shall be smooth, free of extrusion marks or imperfections.
2. Extrusions: ASTM B221, alloy 6063-T5, or other alloy of equivalent durability and strength properties. Extrusions shall have a wall thickness of not less than 0.125-inch except 0.093-inch when reinforcing bosses are provided.
3. Aluminum Castings: ASTM B26 or ASTM B108, alloy and temper recommended by aluminum producer or finisher for casting process used and for use and finish indicated.

B. Zinc and Magnesium Alloy Plates: Metal alloys specifically formulated for photo chemical etching.

C. Acrylic Sheet: ASTM D4802, Category A-1, finish 1. Acceptable products, or equal:

Atohaas North America, Inc.; Plexiglas G
Cyro Industries; Acrylite GP

D. Photosensitive Polymer Sheet: Polyamid resin material specifically formulated for photo chemical etching.

2.4 TEXT AND GRAPHICS APPLICATION METHODS

- A. Silkscreened Graphics: Execute silkscreened images 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 reproduction of the specified art. All edges and corners shall be clean cut. Rounded corners, cut or ragged edges, edge build-up, bleeding, or surface pinholes will not be accepted.

- B. Die Cut Graphics: Ensure that all edges and corners of finished letterforms and graphics are true and clean. Do not use letterforms and graphics with rounded positive or negative corners, nicked, cut, or ragged edges.
- C. Engraved Graphics: Machine-engrave letters, numbers, symbols, and other graphic devices into sign panel on the face indicated to produce precisely formed copy, incised to uniform depth. Use high-speed cutters mechanically linked to master templates in a pantographic system or equivalent process capable of producing characters of the style indicated with sharply formed edges.
- D. Photetched Graphics: Photographically generate text, graphics, and braille and chemically etch the polymer or metal to produce 1/32-inch raised text, graphics, and braille.

2.5 SIGN MATERIALS – INTERIOR PLAQUE SIGNS

- A. Sign Face: High impact Acrylic/PVC thermoplastic alloy, pressure molded using Unibond™ co-molding process.
- B. Tactile Graphics and Text: Provide tactile copy and grade 2 Braille raised 1/32 inch minimum from plaque surface using manufacturer's co-molding process. Glued-on letters are unacceptable.
 - 1. Provide lettering and graphics precisely formed, uniformly opaque to comply with relevant CBC and ADA regulations and requirements indicated for size, style, spacing, content, position, and colors.
- C. Colors: High contrast semi-matte integral colors for graphics. All integral resins shall be U.V. stabilized resins utilizing automotive grade pigments.
- D. Standard Colors: As selected by Architect from manufacturer's standard colors.

2.6 SIGN MATERIALS – EXTERIOR PLAQUE SIGNS

- A. Braille-Tac™ one-piece construction sign system utilizing Chemcast™ chemical etch process to produce raised numbers and letters with corresponding dome shaped, California Grade II Braille (complying with Specification #800), and pictograms, on magnesium alloy sign, all complying with ADA and CABO/A117.1 requirement. All signage will provide 70% contrast between text and background.

2.7 INTERIOR DIRECTIONAL, INFORMATIONAL, AND SAFETY SIGNS

- A. Provide unframed plaque signs.
- B. Panels: Fabricate panels from 1/16-inch thick clear, matte finished, optically corrected, acrylic plastic sheet laminated to 1/8-inch opaque acrylic plastic sheet. Apply non-tactile text and graphics to the backside of the clear acrylic sheet using reverse silkscreen process prior to laminating to the opaque plastic sheet.
- C. Message: As indicated on the Drawings.
- D. Type Face: As indicated on the Drawings.
- E. Colors: Custom color(s) as selected by the Architect.

2.8 PARKING SIGNS

A. Acceptable manufacturer or equal:

Seton; www.seton.com

Traffic and Parking Control Company; www.tapco.net

Substitutions: Section 01 25 13 – Product Options and Substitutions.

B. Sign Panels: Construct sign panels of 20-gage minimum hot-dip galvanized steel sheet or 0.080-inch thick engineer grade reflective aluminum sheet, with rounded corners. Clean and prepare surfaces to assure maximum paint adhesion and paint with reflectorized porcelain enamel. Apply legends, symbols and borders using the silkscreen process.

1. Minimum Fine \$250:

a. Dimensions: As shown on drawings.

b. Graphics: As shown on drawings.

C. Posts: 2-inch diameter galvanized steel, standard weight pipe posts.

D. Comply with 2016 CBC Title 24 Part 2, Chapter 11 and 2010 ADA Standards for Accessible Design, for handicapped accessibility requirements.

2.9 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:

1. Use concealed fasteners and anchors unless indicated to be exposed.

2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.

3. Sign Mounting Fasteners:

a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.

B. Adhesives: Type recommended by the manufacturer of the material specified to be laminated or adhered. No adhesives that will fade, discolor or delaminate as a result of proximity to sunlight or heat there from shall be used. Adhesives shall not change the color or otherwise deteriorate the materials to which they are to be applied. The adhesives shall be of non-staining, nonyellowing quality.

C. Use material in "Two-Face Tape" Paragraph below for small signs only; it is suitable for smooth, nonporous surfaces. Two-face tape is generally 3M brand's "VHB Heavy Duty Mounting Tape."

D. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch thick, with adhesive on both sides.

E. Magnetic Tape: Manufacturer's standard magnetic tape with adhesive on one side.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.10 FABRICATION, GENERAL

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 4. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
- B. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.
- C. Subsurface-Etched Graphics: Reverse etch back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's standard background color coating over enamel-filled copy.

2.11 FABRICATION – INTERIOR PLAQUE SIGNS

- A. Panel Depth: 0.125" thickness for all plaques except Toilet Room Door Signs which shall have 0.250" thick components.
- B. Panel Appearance:
1. Semi-matte clear with color showing through back.
 2. Color: As selected by Architect from manufacturer's standard selection.
- C. Surface Texture: Matte.
- D. Letter Style, Size, and Layout Position:
1. Fonts: As shown on drawings.
 2. Size: As shown on drawings.
 3. Layout Position: As shown on drawings.
- E. Braille Style and Size and Layout Position: Grade 2 California Braille, raised (integral) and translucent same as face of sign.
- F. Text Schedule: As shown on Drawings.
- G. Sign Size: Refer to Sign Type Drawings.
- H. Plaque Edge Detail: Straight.
- I. Installation Method: MH, mounting holes for tamper proof mechanical fasteners and SA, silicone adhesive.
- J. General: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
- K. Preassemble signs in the shop to the greatest extent possible to minimize field assembly. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in a location not exposed to view after final assembly.

- L. Form panels to required size and shape. Comply with requirements indicated for design, dimensions, finish, color, and details of construction.
- M. Coordinate dimensions and attachment methods to produce message panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.

2.12 FABRICATION – EXTERIOR PLAQUE SIGNS

- A. Panels: Fabricate panels from 1/8-inch thick photo sensitized magnesium or zinc alloy. Chemically etch the background to provide borders, text, graphics, and Braille that extend not less than 1/32-inch above the background.
- B. Message: As indicated on the Drawings and determined by the Architect before fabrication.
- C. Type Face:
 - 1. Letters: Upper case letters, font and height as shown on drawings.
 - 2. Numbers: Font and height as shown on drawings.
- D. Sign Finish: Factory applied baked-on-acrylic polyurethane enamel, UV inhibited.
- E. Colors: Sign shall consist of minimum of two colors (text color and 70% contrasting background color). Final colors as selected by Architect from manufacturer's standard colors.

2.13 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site Verification of Conditions: Verify installation conditions previously established under other sections are acceptable for product installation in accordance with manufacturer's instructions.
- B. Scheduling of Installation: Start of installation implies that substrate and conditions are prepared and ready for product installation. Proceeding with installation implies installer's acceptance of substrate and conditions.

3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.

2. Install signs so they do not protrude or obstruct according to the accessibility standard, CBC 11B-307.
 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Accessibility: Install product at heights to conform to 2010 ADA Standards for Accessible Design, and applicable local amendments and regulations.
- C. Mounting Methods: Install product in locations indicated using mounting methods recommended by sign manufacturer and free from distortion, warp, or defect adversely affecting appearance. Do not install signs on doors or other surfaces until finishes on such surfaces have been applied.
1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
 2. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
 3. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
 4. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
 5. Magnetic Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position.
 6. Adhere signs to glass with adhesive or two-face tape.
- D. Install signs within the following tolerances and in accordance with manufacturer's recommendations:
1. Interior Signs: Within 1/4 inch vertically and horizontally of intended location.
 2. Exterior Signs: Within 1 inch vertically and horizontally of intended location.
- E. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite of glass to conceal back of sign.
- F. Direct-Burial Method for Posts:
1. Excavation: Excavate posthole to dimensions indicated.
 2. Setting in Cast-in-place Concrete: Set post in position, support to prevent movement, and place concrete in posthole as indicated.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

3.4 SIGN SCHEDULE

- A. Schedule: Refer to signage schedule as shown on Drawings for sizes, locations, and layout of signage types, sign text copy, and graphics.

END OF SECTION

06/06/18

SECTION 10 26 13

CORNER GUARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Stainless steel corner guards.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 SUBMITTALS

- A. Product Data: Submit product data showing list of materials and hardware, sizes, and installation methods for each type of substrate.
- B. Shop Drawings: Submit shop drawings showing locations, extent, and installation details of corner guards. Show methods of attachment to adjoining construction.
- C. Submittal procedures and quantities are specified in Section 01 33 00.

1.3 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Provide corner guard system components that are identical to those tested in accordance with ASTM E84 for the fire performance characteristics specified. Identify components with appropriate markings from a testing and inspection organization acceptable to the State Fire Marshal.

Flame Spread: 25 or less.

Smoke Developed: 450 or less.

- B. Single Source Responsibility: Obtain each color, grade, finish and type of wall and corner guard system component from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
- C. Design Criteria: The drawings indicate the size, profile and dimensional requirements of wall and corner guard system components required and are based on the specific types and models specified. Wall and corner guard system components by other manufacturers may be considered provided deviations in dimensions and profiles are minor and do not change the design concept as judged by the Architect.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in original factory wrappings and containers, clearly labeled with identification of manufacturer, brand name, quality or grade, and fire hazard classification.
- B. Store materials in original undamaged packages and containers inside a well-ventilated area protected from weather, moisture, and soiling.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: AISI Type 304, stainless steel plate, minimum 16 gage, No. 4 satin finish.
- B. Fasteners: Provide nonmagnetic stainless steel screws, bolts, and other fasteners compatible with hardware, anchors, and other items being fastened. Use theft-proof fasteners where exposed to view.

2.2 CORNER GUARDS

- A. Stainless Steel Corner Guards: Manufacturer's standard paper-covered satin finish, 16 gage minimum, stainless steel corner guards, height as indicated, with 2" by 2" wings. Provide 90 degree turn, mounting holes 8 inches on center, formed edges. Mount with stainless steel countersunk screws. Acceptable products or equal:

American Floor Products Co., Inc.; www.afco-usa.com; Lunar (CG-2143); Style L-1 right angle.

Pawling Corporation; www.pawling.com; Type CG Series.

Substitutions: Section 01 25 13 – Product Options and Substitutions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions in which corner guards will be installed. Complete all finishing operations, including painting, before beginning installation of corner guards.

3.2 INSTALLATION

- A. Install units plumb, level, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished work.

3.3 CLEANING

- A. Immediately upon completion of installation, clean metal components in accordance with the manufacturer's recommendations.
- B. Remove paper protection from stainless steel corner guards and clean in accordance with the manufacturer's recommendations.

END OF SECTION

06/06/18

SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Fire extinguishers and fire extinguisher cabinets.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES

- A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

ASTM International (ASTM)
National Association of Architectural Metal Manufacturer's (NAAMM)

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Cabinets: Materials description for fire extinguisher cabinets include roughing-in dimensions, details showing mounting methods, relationships to surrounding construction, door hardware, cabinet type and materials, trim style and door construction, door style and materials.
 - 2. Extinguishers: Materials description for fire extinguishers; include ratings and classifications.
 - 3. Installation instructions for each product specified.
- B. Shop Drawings:
 - 1. Small-scale plans showing locations of fire extinguisher cabinets and individual fire extinguishers.
 - 2. Product Schedules showing each type of cabinet and extinguisher to ensure proper fit and function.
 - 3. Indicate installation procedures and accessories required for a complete installation.
- C. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fire extinguishers and fire-protection cabinets to include in maintenance manuals.

1.5 REGULATORY REQUIREMENTS

- A. Fire extinguishers shall be labeled by Underwriters' Laboratories, Inc (UL) for the specified ratings and classifications, as acceptable to the State Fire Marshal.

- B. Fire extinguisher cabinet doors to open with 5 pounds maximum force.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver extinguishers and cabinets to the site in unopened containers, labeled plainly with the manufacturer's names and brands. Deliver cabinets and extinguisher to the site ready for installation.
- B. Store cabinets and extinguisher 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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
- C. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

2.2 FIRE EXTINGUISHERS

- A. Multi-Purpose Dry Chemical Type: UL rated 2A-10B:C, in nominal 5 pound capacity.
 - 1. Construction: Heavy duty steel cylinder with metal valve and siphon tube, O-ring seal, replaceable valve stem seal, visual pressure gage, pull pin and upright squeeze grip.
 - 2. Finish: Factory powder-coated; Red.
 - 3. Effectiveness (Rating): Class A, B, and C fires.
 - 4. Acceptable products or equal:

J. L. Industries, Inc., a division of Activar Construction Products Group;
www.activarcpg.com; Cosmic 5E.
Larsen's Manufacturing Co.; Model No. MP5.
Potter-Roemer Div.; No. 3005.

2.3 FIRE EXTINGUISHER CABINETS

- A. General: Provide fire extinguisher cabinets where indicated, of suitable size for housing fire extinguishers of types and capacities indicated or specified.
- B. Acceptable products or equal:
 - JL Industries; Cosmopolitan Series. (Basis-of-Design product).
 - Larsen's Manufacturing Co.; (SS).
 - Potter-Roemer Div.; Alta (stainless).
- C. Cabinet with Stainless Steel Trim and Door: Cosmopolitan Series.
 - 1. Cabinet Style: Semi-recessed.

2. Components:
 - a. Tub (Semi-recessed Cabinets): Cold-rolled steel.
 - 1) Finish: Factory-applied powder coat paint finish.
 - a) Standard Color: White.
 - b. Door and Trim Construction: Stainless steel; flush doors with 5/8 inch door stop attached by continuous hinge and equipped with black ABS recessed pull with roller catch.
 - 1) Finish: Factory-applied ground and polished finish.
 - a) Standard Finish: #4 directional satin finish.
 - c. Trim Style and Depth:
 - 1) Semi-Recessed Cabinet:
 - b) Rolled Edge: 2-1/2 inch.
 - 2) Trim Dimensions: 1-3/4 inch face trim on frame and 1-1/4 inch face trim on door.
3. Fire-Rating: Nonfire-rated; and Fire-Rated for 1-hour combustible and noncombustible wall systems.

2.4 CABINET DOOR STYLE

- A. Door Style: Style V: Vertical Duo Panel; narrow vertical glazing full height of door; with ADAC Flush Pull Handle. Plastic recessed cup-type handle.
- B. Door Glazing: Clear tempered glass.

2.5 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguishers to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish (red or black in color).
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

J. L. Industries, Inc., a division of Activar Construction Products Group;
www.activarcpg.com;
 Larsen's Manufacturing Co.
 Potter-Roemer Div.

2.6 FABRICATION

- A. Fire-Extinguisher Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 1. Weld joints and grind smooth.
 2. Provide factory-drilled mounting holes.
 3. Prepare doors and frames to receive locks.
 4. Install door locks at factory.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
 1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
 2. Fabricate door frames of one-piece construction with edges flanged.
 3. Miter and weld perimeter door frames.

- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire-protection cabinets after assembly.
- D. 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.

2.8 SOURCE QUALITY CONTROL

- A. Ship extinguishers to the Project site fully charged, EXCEPT those which contain water as an extinguishing agent, if any.
- B. Obtain Fire Extinguishers and Fire Extinguisher Brackets from same manufacturer to ensure compatibility.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where semi-recessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare recesses in walls for semi-recessed fire extinguisher cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.

3.3 INSTALLATION

- A. Mount items specified herein in locations indicated and at mounting height of +48-inches to fire extinguisher handle above finished floor, or at heights to comply with applicable regulations of State Fire Marshal. Coordinate the cabinet manufacturer's mounting details with other trades as their work progresses.
- B. Securely fasten fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions. Use oval head fasteners with exposed surfaces of same finish as cabinet. Fasten cabinets to wood studs with full threaded wood screws or with sheet metal screws.
- C. Maintain fire ratings where cabinets are recessed into fire-rated wall systems.

- D. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.
- E. Wall Signs:
 - 1. Location: Where shown or directed.
 - 2. Apply on walls after field painting is completed and has been accepted.

3.4 FIELD QUALITY CONTROL

- A. Ensure that each extinguisher is fully charged, and that inspection of each extinguisher has been performed, as evidenced by the National Association of Fire Equipment Distributors certification tag, just prior to turnover.

3.5 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire-extinguisher cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire-extinguisher cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire-extinguisher cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire-extinguisher cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-extinguisher cabinet and mounting bracket manufacturers.
- E. Replace fire-extinguisher cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

06/06/18

SECTION 11 52 13

PROJECTION SCREENS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Manually operated, front-projection screens and accessories.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Requirements:
 - 1. Section 06 10 53 – Miscellaneous Rough Carpentry: Support framing for front-projection screens.

1.2 DEFINITIONS

- A. Gain: Indication of screen's luminance or brightness, measured perpendicular to screen center and relative to magnesium carbonate block, which serves as standard for 1.0 gain. Higher numbers indicate greater brightness.
- B. Viewing Angle: Horizontal angle from perpendicular center of screen at which gain or brightness decreases by 50%.
- C. Format: Proportion of projection screen viewing area expressed as a ratio of width/height.
 - 1. 16:10 Wide: 1.60:1.

1.3 REFERENCES

- A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

Aluminum Association (AA)
American Society for Testing and Materials (ASTM International)

- B. Society of Motion Picture and Television Engineers (SMPTE):
 - 1. SMPTE RP 94-2000 Gain Determination of Front Projection Screens.

1.4 ACTION SUBMITTALS

- A. Product Data: Submit copies of manufacturer's catalog cuts, specifications and installation instructions for each type of projection screen.
- B. Shop Drawings: Submit shop drawings showing dimensions and details of mounting for each type of projection screen, and seams in viewing surfaces of projection screens.

1. Shop drawings shall indicate all grounds, backing, blocking, sleepers and other items required for the installation of equipment that is to be furnished and installed as part of the structure. Provide necessary templates.
 - C. Samples: Submit 2 samples of screen finish material having dimensions of 6 inches x 6 inches.
 - D. Submittal procedures and quantities are specified in Section 01 33 00.
- 1.5 CLOSEOUT SUBMITTALS
- A. Operation and Maintenance Data: Submit for products in accordance with Section 01 78 23. Include:
 1. Manufacturer's instructions detailing maintenance requirements.
 2. Parts catalog that includes complete list of repair and replacement parts, with cuts and identifying numbers.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Environmental Limitations: Do not deliver or install front-projection screens until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- 1.7 COORDINATION
- A. Coordinate layout and installation of front-projection screens with adjacent construction, including ceiling suspension systems, light fixtures, HVAC equipment, and partitions.

PART 2 - PRODUCTS

2.1 MANUALLY OPERATED SURFACE MOUNTED PROJECTION SCREENS

- A. General: Provide surface mounted, heavy duty manually operated projection screens. Acceptable products or equal:

Da-Lite Screen Co., Inc.; www.da-lite.com Model C with CSR
Bretford Manufacturing Co.; www.bretford.com; Series 500
Draper Shade & Screen Co., Inc.; www.draperinc.com; Luma 2 with AutoReturn
- B. Screen Operation: Manually operated, retractable projection screen mounted on ball bearing rigid steel spring roller with controlled screen return (CSR) mechanism.
 1. Form screen bottom into pocket holding tubular metal slat with attached steel pull bail.
 2. Protect slat ends with heavy-duty plastic end caps.
 3. Include 6 feet pull cord.
- C. Screen Mounting Type: Wall mounted with screen case.
- D. Screen Case:

1. Material:
 - a. 21 gage steel.
 - b. Case is designed to receive mounting hardware and is sized to suit projection screen.
 2. Design: Flat-backed case with heavy duty plastic end caps concealing roller ends with steel inner plates to support roller. End caps to form sturdy brackets for wall or ceiling installations.
 3. Include built-in bumper stops to prevent slat wedging into case.
 4. Length: 123-5/16".
 5. Finish: Powder coated white.
- E. Screen Size:
1. Viewing Area: 72-1/2 inches High x 116 inches Wide.
 2. Overall Dimensions: H 108 inches x W 116 inches.
- F. Screen Viewing Surface:
1. Permanently attached to roller.
 2. Front projection, flame retardant, mildew resistant, fiberglass fabric, black-backed with standard black borders, easily cleaned with mild soap and water solution.
 3. Seams: Seamless when both screen dimensions are less than 10 feet.
 4. Gain: To SMPTE RP 94-2000, 1.1.
 5. Viewing Angle: 50.
 6. Format: 16:10 Wide – 1.60:1.
 7. Basis-of-Design Screen Surface: Da-Lite Screen Company, Inc.:
 - a. High Contrast Matte White.
- G. Accessories:
1. Screen Drop: Provide extra drop length of 36 inches, with black fabric, and located at top of screen.
 2. Pull Rod: 38 inches, zinc plated with plastic handle grip.
 3. Installation Hardware: Fasteners and other components of type, size and spacing recommended by manufacturer for complete, functional and secure installation of projection screen.
 4. Wall Brackets:
 - a. Fixed Length: Extends 6 inches.
 - b. Color: White.
 - c. Capacity: 75 lb per pair maximum.
- H. Holdback Brackets: Provide manufacturer's standard holdback brackets to secure screen against wall when in the fully open position.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions:

1. Verify that conditions of substrates previously installed under other sections are acceptable with manually operated projection screen installation.
2. Inform Architect of unacceptable conditions immediately upon discovery.
3. Proceed with installation only after unacceptable conditions have been corrected.

3.2 COORDINATION

- A. Coordinate projection screen placement with other ceiling- and wall-mounted components.

3.3 INSTALLATION

- A. Install manual projection screens in accordance with the drawings, the manufacturer's directions and instructions, and to suit the conditions. Proper backing shall be provided for all items.
- B. Inserts, anchors and required devices shall be furnished and installed.
- C. Front Projection Screens: Install projection screens and accessories at locations indicated in accordance with the manufacturer's instructions. Install screens level, plumb, secure and at proper height.
1. Test manually operated units to verify that screen operating components are in optimum functioning condition.

3.4 PROTECTION

- A. Provide protection for installed screens so that they will be in satisfactory operating condition, without damage, at completion of the project. Repair or replace damaged units as directed by the Architect.
- B. Installation shall be made without damage to the surfaces to which the items are attached. After completion of the installation, accessories and surfaces shall be cleaned and left in perfect condition.

END OF SECTION

06/06/18

SECTION 12 24 13

ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manually operated roller shades with single rollers.

B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

C. Related Sections:

1. Section 06 10 53 "Miscellaneous Rough Carpentry" for blocking and backing for attachment of shades to wood substrate.
2. Section 07 92 00 "Joint Sealants" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.

1.2 REFERENCES

A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

B. American Type Culture Collection (ATCC):

1. 9642, 9644, 9645 - Fungi, Yeast and Yeast Genetic Stock

C. ASTM International:

1. ASTM G 21 - Determining Resistance of Synthetic Polymeric Materials to Fungi.

D. Federal Specifications:

1. FS CCC-T-1Slb: Flame Retardancy of Textiles.

E. Glass Association of North America:

1. GANA - Glazing Manual.

F. National Fire Protection Association (NFPA):

1. NFPA 70 - National Electrical Code.
2. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Film.

G. State of California Code of Regulations:

1. Title 19 - Public Safety, State Fire Marshal.

H. Underwriters' Laboratories, Inc. (UL)

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.
- B. Shop Drawings: Submit drawings, including actual measurements taken at the project where practical. Drawings shall include head, jamb and sill details as necessary to coordinate work with surrounding conditions and construction.
 1. Provide elevations, sections, and details. Show tube and bracket sizes for each condition.
 2. Show size and location of blocking and backing required for installation of shades. Show mounting details and method of attachment of shades to backing.
- C. Selection Samples: For each finish product specified, two complete sets of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.
- D. Verification Samples: Submit one fully operational window shade sample, not less than 16 inches wide by 36 inches long for each type of roller shade indicated, complete with selected aluminum trim showing color and shade cloth including sample of seam/batten when applicable.
 1. Valance/Fascia: Submit 3" samples of specified finish.
- E. Product Schedule: Provide schedule of chain operated clutch roller shades. Use the same designations as indicated on drawings. If necessary, indicate tube diameter for each shade.
- F. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer. Submit a letter indicating that installer is authorized by the manufacturer to install specified product.
- B. Product Certificates: For each type of shadeband material, signed by product manufacturer.
- C. Installation Instructions: Submit complete manufacturer's installation instructions.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roller shades to include in maintenance manuals. Include maintenance procedures, recommended maintenance materials, parts diagrams, and suggested schedule for cleaning. Include precautions about cleaning materials that could damage or discolor the shade fabric.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firm specializing in manufacturing manual roller shades with at least 7 years experience.
- B. Installer Qualifications: Approved by roller shade manufacturer. Installers shall be specially trained in the installation of chain operated clutch roller shades. Installers shall have completed at least 5 commercial installations of chain operated clutch roller shades similar to those specified in this Section.

- C. Fire-Performance Characteristics: Fabrics shall be inherently flame retardant material or shall be flame retardant treated to comply with the small scale and large-scale test requirements of NFPA 701 and 2013 California Code of Regulations, (CCR) Title 19, Section 1273.3. If treated, fabric shall pass the small and large scale test after being subjected to the accelerated dry cleaning or laundering cycles specified in NFPA 701. Material requiring flame retardant treatment shall be treated by an applicator holding a valid "Flameproofers Certificate" from the State Fire Marshal.
- D. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Do not deliver shades to the project until all concrete, masonry, plaster and other wet work has been completed and is dry. Deliver prefabricated shades to site in labeled protective packages, uniquely identified for each intended location. Schedule delivery to prevent delays but minimize on-site storage.
- B. Storage: Store materials in manner recommended by shade manufacturer, inside, under cover, and in manner to keep shades dry, protected from weather, direct sunlight, surface contamination, corrosion and damage from construction traffic and other causes.

1.8 FIELD MEASUREMENTS

- A. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry. Air conditioning system shall be operating, and ambient temperature shall be between 60 degrees F. and 85 degrees F. Relative humidity shall be between 45 percent and 65 percent.
- B. Before Installation Begins:
 - 1. Roof shall be tight, windows and frames installed and glazed, and interior doors hung.
 - 2. Wet work including concrete, masonry, stucco, shall be complete and dry.
 - 3. Application of gypsum wallboard, joint treatment, taping and sanding shall be complete and dry.

4. Ceilings, window pockets, electrical, and mechanical work above the product shall be complete.
 5. Flooring materials such as resilient, tile, etc. must be completed.
- C. Electrical power (110 volt AC) shall be available for installer's tools within 500 feet of product installation areas.

1.10 WARRANTY

- A. Provide an extended warranty under the provisions of Section 01 78 36.
- B. General Warranty: The warranties 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.
- C. Special Warranty: Submit a written warranty signed by roller shade manufacturer and Contractor agreeing to repair or replace roller shade components that do not remain fully operational for the warranty periods specified below after date of "Substantial Completion. Warranty does not include failure of the bead chain.
1. Shade cloth: 25 years.
 2. Operating hardware: 25 years.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Acceptable manufacturer or equal:
1. Mariak Contract; www.mariak.com
 2. Mecho-Shade Systems, Inc.; www.mechoshade.com
 3. Draper, Inc.; www.draperinc.com
 4. Substitutions: Section 01 25 13 – Product Options and Substitutions.
- B. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 SYSTEM DESCRIPTION

- A. Chain operated clutch roller shade system shall consist of a roller, brackets to support the roller, a flexible fabric carried by the roller, a means of attaching the material to the roller, a bottom bar, and a chain operator to lift and lower the shade.

2.3 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

- A. Shadecloth Material:
1. Provide sufficient length of material to allow two complete wraps around roller when shade is fully extended. Roller-in-hem construction prevents fabric from being pulled off roller. Fabric is to be attached by double wide staples. No adhesive attachment is allowed.

2. Material for general shading: Verosol 802 EnviroScreen G3 Flame Retardant, Semi-Transparent, Metallised Fabric.
 - a. Fabric Density: Semi-Transparent.
 - b. Composition: 100% PES Inherent FR.
 - c. Weight: 250 grams. per m².
 - d. Thickness: 0.50 mm.
 - e. Width: 240 cm.
 - f. Color Fastness: ≤ 5 .
 - g. Formaldehyde Free: Yes.
 - h. Anti Static: Yes.
 - i. PVC Free: Yes.
 - j. Antimicrobial Properties: ASTM E2149.
 - k. Flame Retardancy: NFPA 701, DIN 4102 B1; AS 1530, BS 5867 Part 2.
 - l. Environmental Standards: Formaldehyde and PVC-free; Okotex Standard 100, ISO 140001 and ISO 9001; Greenguard Gold, Ecospecifier; Cradle-to-Cradel Bronze.
 - m. Solar Reflection Outside: 74% (White); 74% (Black).
 - n. Light Transmission: 4% (White); 2% (Black).
 - o. Openness Factor (nominal): 2%.
 - p. IR emissivity (metal side): 0.19.
3. Substitutions: Section 01 25 13 – Product Options and Substitutions.
4. Fire-Test-Response Characteristics: Material shall pass the following:
 - a. Small scale vertical burn: NFPA 701-1999, Test Method No. 1, and California Title 19.
 - b. Large scale vertical burn: NFPA 701-1999, Test Method No. 2.
 - c. Fire rating: NFPA Class A.
5. Anti-Microbial Characteristics: Shade cloth shall conform to requirements for 'No Growth' in accordance with ASTM G 21 results for fungi, using fungus samples ATCC 9642, 9644, and 9645.
6. Color and Pattern: As selected by Architect from manufacturer's standard colors and patterns.

B. Rollers:

1. Clutch Mechanism: Corrosion resistant PA-6 plastic with glass fiber and internal mechanism of Nylon 6 construction. Provide a heavy-duty single spring that creates a positive mechanical relationship between the roller shade tube unit and the universal installation bracket to ensure stationary positioning in the static state. When activated the wrap spring shall release and permit the clutch to turn while reducing friction on the clutch. Clutch mechanisms with multiple springs are not acceptable.
 - a. Clutch End Locking System: The clutch shall have a locking system, which prevents the shade from coming out of its brackets if the shade is operated incorrectly.
2. Clutch Bracket: The clutch shall be fixed to the installation bracket with tech screws. It must be removable without having to remove the installation brackets from the wall. Clutch mechanism shall be fastened with screws and not riveted to the brackets.
3. Spring Loaded Idle End Cap: The idle end of clutch shall be spring loaded to provide secure anchorage into end bracket and to provide for simple and easy installation.
4. Spring roller diameter length and material as needed to support shade length, width, and material weight 1-1/4" diameter minimum x width needed to cover window.

5. Use steel rollers for all shades exceeding 45 in width; heavy-duty springs and positive locking mechanisms.
- C. Tube Mechanism: Extruded T6 aluminum with a wall thickness not less than 0.062 inch. Each tube shall have at least one Secure Grip Spline fabric-fixing slot to increase the rigidity of the tube and eliminate sagging when the shade is operated. T5 aluminum is not acceptable.
1. Tube sizes shall be as proposed by manufacturer for each condition, and as indicated on approved submittals.
 2. Spline Mounting System: Secure Grip Spline Method, consisting of flexible PVC extrusion RF (radio frequency) or impulse welded to the shade fabric. The spline shall be inserted into a slot on the extruded aluminum tube. The spline shall provide a positive mechanical attachment of the shade band to the tube. The spline shall be designed to allow fabric to be easily removed and re-installed on the roller shade tube without having to remove the roller tube from the brackets. Splines that slide in the tube mechanism from the edge are not acceptable. Double-sided tape or glue methods of fabric attachment are not acceptable.
- D. Hem Bar/Slat:
1. Three Sided Welded Pocket (Bottom Weight): Aluminum extrusion one inch in height held inside a fabric bottom-pocket. The bottom-pocket shall be created by folding a 1-1/4 inch section of fabric behind the bottom of the shade and RF or impulse welding the fabric to itself. After the aluminum weight is inserted into the bottom-pocket the edges shall be sealed by again RF or impulse welding the fabric edges to itself.
- E. Tube Mounting Brackets: Universal type, capable of attachment at top, face, and with left hand or right hand controls. Brackets shall accept end cap locking system. If selected without Valance/Fascia, bracket color shall be white or black, painted finish as selected. Zinc plated or mill finish brackets are not acceptable. Size shall be as required for each condition, and as indicated on approved submittals.
- F. Chain:
1. Chain: Qualified No. 10 stainless steel ball chain. Nickel plated steel chain not acceptable. Include cord clasp to be mounted at appropriate height above window sill side wall.
 2. Braided fabric cord is not acceptable.
 3. Chain shall be rated for 90 lbs. breaking strength.
- G. Valance/Fascia: Provide an aluminum fascia in square profile to conceal the roller shade tube mechanism. Valance/fascia shall have a wall thickness of 5/16", with paint finish in color as selected by Architect from manufacturer's standard colors. The fascia shall be attached to the tube mounting brackets by snapping it into place on a hinge rib clip. Size shall be as required to conceal the roller tube and rolled-up shade fabric. Color as selected by Architect from manufacturer's standard colors.
1. Where ends of fascia are exposed, provide end caps.

2.4 ROLLER SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
 - 1. Between [Inside] Jambs Installation: Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise. Comply with manufacturer's edge clearance standards and recommendations. Length equal to head-to-sill dimension of opening in which each shade is installed.
 - 2. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- C. Fabricate shades square, and free of sharp edges, burrs or other defects.
- D. Shadeband Fabrication: Fabricate shade cloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shade cloth to roll true and straight without shifting sideways more than 1/8-inch in either direction per 8 feet of shade height due to warp distortion or weave design.
- E. Multi-banded Shades: Provide for operation of multiple shade bands by a single chain operator subject to manufacturer's design criteria. Multi-banded manually operated shades shall be capable of smooth operation when offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve (12 degree total offset).

2.5 FINISHES

- A. Aluminum Components: Architect shall select from manufacturer's standard silicone polyester based baked enamel.
- B. Steel Components: Cadmium-plated, satin-finished, or bonderized prior to painting with Manufacturer's standard baked-enamel finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work. Do not commence installation until conditions are satisfactory. Commencement of installation indicates acceptance of site conditions by Contractor. Notify the Architect upon inspection when the project conditions are unacceptable for shade installation. Beginning of installation means acceptance of substrate and project conditions.
- B. Verify that room temperature is a minimum of 65 degrees F. and that painting and other dust-producing operations are complete.

3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches to interior face of glass. Allow proper clearances for window operation hardware and accessories to provide smooth operation without binding.
- B. Install units within the following tolerances:
 - 1. Maximum variation of gap at window opening perimeter: 1/4-inch, per 8-feet (+/-1/8 inch) of shade height.
 - 2. Maximum offset from level: 1/16-inch per 5-feet of shade width.
- C. Mounting brackets for shades shall not be installed on window stops.
- D. Roller shade Locations: As indicated on Drawings.

3.3 ADJUSTING

- A. Adjust drive / brake mechanism of units for smooth operation. Adjust shade and shade cloth to hang flat without buckling or distortion. Replace any units or components that do not hang properly or operate smoothly.

3.4 CLEANING AND PROTECTION

- A. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION

06/06/18

SECTION 21 13 13

WET-PIPE FIRE SPRINKLER SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Construction Services Agreement, including General and Special Conditions, Division 1 apply to this section.

1.2 DESCRIPTION OF WORK

- A. The Contractor shall furnish all labor, tools, equipment, services, and transportation necessary for, or reasonably incidental to, the construction and completion order of the fire protection work, including, but not limited to, the following:
 - 1. The installation of an automatic fire sprinkler system complete and ready for operation, for the entire building including but not limited to the mechanical equipment rooms, accessible shafts, exterior soffits, canopies, and connection to public water main.
 - 2. Prepare shop drawings, product submittals based on DSA-approved design documents and obtain all necessary approvals. Any major changes Contractor to verify existing site conditions and coordinate with other trade before construction work.
 - 3. Sprinkler system shall be monitored by a central alarm monitoring company. This monitoring shall include water flow indicators and tamper switches on all control valves.
 - 4. Provide complete as-built drawings of the fire sprinkler and standpipe system in AutoCAD 2013 version (or higher) using architectural backgrounds. Drawings shall include exact locations of all piping, sprinkler heads, sprinkler control valve assemblies, pipe supports, bracing, etc.
 - 5. Pay for all necessary fees.
 - 6. Painting of exposed piping and supports.
 - 7. Testing and adjusting of completed work, inspections and instructions. All inspections, testing and maintenance work required by NFPA 25 and recommended by the equipment manufacturer shall be provided. Work shall include operation of sprinkler system alarm and supervisory devices.
 - 8. Repair of all damage done to premises as a result of this installation and removal of all debris left by those engaged in this installation.
 - 9. Excavation, trenching and backfill required in this section of work.

1.3 RELATED WORK

- A. Section 07 84 13, Penetration Fire Stopping.
- B. Section 07 92 00, Joint Sealants.
- C. Section 08 31 16, Access Doors and Frames.
- D. Section 09 91 00, Painting.
- E. Section 28 31 00, Fire Alarm System.
- F. Division 26, Electrical.
- G. Division 33, Utilities.

1.4 REFERENCES AND STANDARDS

- A. Regulatory compliance: All work performed under this Division shall comply with the latest currently adopted editions of all codes and regulations. The following references and standards are hereby made a part of this Section and work shall conform to applicable requirements herein except as otherwise specified herein or shown on the Drawings.
- B. Codes and Standards: Conform to all applicable codes and standards as stated herein and as described in Division 1, including the following:
 - 1. California Building Code, 2016 Edition.
 - 2. California Fire Code, 2016 Edition.
 - 3. State of California Administrative Code (CAC) Titles 8, 17, 21, 22 and 24, 2016 Edition.
 - 4. California Electrical Code (CEC), 2016 Edition.
 - 5. Comply with all ADA and California Title 24 requirements for disabled access.
 - 6. Division of State Architect, State of California (DSA).
 - 7. Local Fire Prevention Bureau requirements.
 - 8. Comply with the latest edition of all applicable standards, including ANSI, ASTM, and OSHA.
 - 9. NFPA - National Fire Association Compliance: Install fire protection systems in conformity with the requirements of the currently adopted editions of the following:
 - a. NFPA 13 - Standard for the Installation of Sprinkler Systems
 - b. NFPA 24 -Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
 - c. NFPA 25 -Standard for the Inspection, Testing and Maintenance of Water Based Fire Protection Systems.
 - d. NFPA 70 - National Electrical Code.
 - e. NFPA 72 - National Fire Alarm and Signaling Code.
- C. Minimum requirements: The requirements of these Specifications are the minimum that will be allowed, unless such requirements are exceeded by applicable codes or regulations, in which the local regulatory code or regulation requirement shall govern.
- D. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted Authorities Having Jurisdiction and from the Owner's Representative.

1.5 WORK RESPONSIBILITIES

- A. Site Conditions:
 - 1. Examine the drawings and the specifications, survey the existing site conditions, and include necessary allowances in bid proposal.
 - 2. Resolve conflicts with code requirements, site conditions, the work of other trades, or other mechanical contractors.
 - 3. Verify the location of all existing utilities prior to construction and protect from damage.
 - 4. Pay all costs incurred due to damage of existing utilities or other facilities.
- B. Responsibility:
 - 1. Provide complete functioning systems and include all labor, material, associated tools, and transportation required for the system to operate safely and satisfactorily.
 - 2. Provide all work necessary for a complete wet fire protection system whether or not specifically mentioned in the specifications.
 - 3. Coordinate the installation of fire protection items with the schedules for work of other trades and other contractors to prevent delays in total work. Assume responsibility for any cooperative work which must be altered due to lack of proper coordination or failure to make proper provisions in time.
 - 4. Be specifically responsible for ensuring that coordination between the fire sprinkler system work and the fire detection and alarm system work takes place to ensure full awareness of the location of all fire sprinkler system components (including, but not

limited to, control valves, flow switches, supervisory switches and alarm bells) requiring connection to the fire detection and alarm system.

1.6 PERMITS, LICENSES, AND INSPECTIONS

- A. Obtain and pay for all permits, fees and inspections required by work under this Section.
- B. Inspections: A pre-test for the EOR and IOR shall be carried out prior to the inspection by the Authority Having Jurisdiction from the start to the finish without any repairs or the test restarts from the beginning. All work shall be regularly inspected by the Authority Having Jurisdiction. Certificates of approval shall be delivered to the Owner's Representative. Be responsible for notifying the authority having jurisdiction when work is ready for inspection.

1.7 DRAWINGS

- A. Drawings indicate general arrangement of piping and equipment. Should it be necessary to deviate from arrangement or location indicated in order to meet architectural conditions or site conditions, or due to interference with work in other divisions, such deviations as offsets, rises, or drops in piping that may be necessary, whether shown or not, shall be made at contractor's expense.

1.8 COOPERATION WITH OTHER TRADES

- A. Schedule work and cooperate with other divisions to avoid delays, interferences and unnecessary work, conforming to construction schedule, making installation when and where required. A special effort shall be made to coordinate with the mechanical contractor so as not to block installation of the mechanical systems. The clearances above ceilings on this project are limited and the ductwork is to have the highest priority. All fire sprinkler work is to be coordinated with the mechanical contractor such that the ductwork can be installed in the locations shown on the mechanical drawings. If installed work is later found to interfere with work of other divisions, make all necessary changes at contractor's expense.

1.9 REVIEW OF CONSTRUCTION

- A. The Owner's Representative may review work at any time.
- B. Advise Owner's Representative fourteen (14) calendar days in advance that work is ready for review at following times:
 - 1. Prior to buried work.
 - 2. Prior to concealment of contract items those have been completed.
 - 3. When requirements of Contract have been completed.
 - 4. Prior to installation of suspended dry wall and ceiling.
- C. Do not backfill or conceal work without Owner Representative's consent.
- D. Maintain on job a set of specifications and drawings for use by the Owner's Representative.
- E. Noncompliance: Should any of the work be covered up or enclosed prior to all required inspections and approvals, uncover the work as required and, after it has been completely inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Owner's Representative and at no additional cost to the Owner.

1.10 SYSTEM ACCEPTANCE

- A. Acceptance shall be contingent on:
1. Completion of the installation of all systems required for a complete and functional wet sprinkler system.
 2. Submission and acceptance of operating and maintenance data.
 3. Completion of pipe and valve identification.
 4. Completion of cleaning.
 5. Satisfactory operation of all systems for a period of one (1) week.
 6. Satisfactory completion of the acceptance tests which shall demonstrate compliance with all performance and technical requirements of the Contract Documents.
 7. Submission of as-built drawings.
 8. Final inspection and acceptance by DSA (Division of State Architect), Local Fire Prevention Bureau, and Authorities Having Jurisdiction.

1.11 DAMAGE BY LEAKS

- A. Be responsible for damage to any part of the premises caused by leaks in the pipe or equipment installed under applicable section for a period of twelve (12) months from the date of acceptance of the work by the Owner.

1.12 SUBMITTALS

- A. Submit product data in accordance with Division 1 and as follows:
- B. Submittal Requirements:
1. Submit manufacturer's product brochures for all products. Written descriptions of products are not acceptable. Furnish, all at one time, prior to any installation, valid submittal data on material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on equipment schedules. Product submittals shall be bound in a three (3) ring binder, with table of contents and tab set for each system. "Product Submittals" shall match "Operations and Maintenance Manuals".
 2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
 3. Submittals will be checked for general conformance with the design concept of the project but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly design and install work.
 4. To be valid, all product submittals must:
 - a. Identify project name and location, Contractor's, Subcontractor's, suppliers or manufacturer's name, address, and telephone number.
 - b. Identify manufacturer's name and model numbers.
 - c. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.
 - d. Include all pertinent construction, installation, performance and technical data.
 - e. Have all product data sheets clearly labeled to indicate the individual item being submitted. In addition, all required options and accessories shall be clearly marked.
 - 1) Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding equipment tag number.
 - 2) Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, and item numbers.
- C. Shop Drawings:

1. General: Prepare and submit plans, sections, details and diagrams to required scales for specified areas. Drawings shall be prepared using AutoCAD 2013 (or higher), format. Drawings shall be coordinated, dimensioned and indicate equipment, pipe, duct, plumbing, and electrical in relation to architectural and structural features. Include minor piping, drains, etc. Indicate exact locations and elevations of valves, piping specialties, access doors, etc.
2. Complete and detailed shop drawings of a scale no smaller than that of the design documents shall be maintained throughout the coordination and construction phase indicating the work of all trades clearly. All equipment including piping, etc. shall clearly identify both top and bottom elevations as well as distances from equipment to established building lines. Coordinate with other trades and field conditions and show dimensions and details including building construction and access for servicing.
3. Use of contract documents for shop drawings is not acceptable.
4. Required Drawings: Prepare and submit drawings for all areas and all fire protection work. Scale shall be minimum 1/4"=1'0" in mechanical rooms, and a minimum 1/8"=1'0" elsewhere.
5. Drawings shall be detailed in accordance with NFPA 13, 14 and 20. Shop drawings shall indicate accurate locations of all piping (with all exposed piping clearly designated), sprinkler heads, seismic braces, pipe anchors and hangers, drain locations, inspector test connections, and other apparatus associated with these systems in respect to architectural conditions, structural conditions, lighting layouts, diffuser layouts, plumbing, mechanical, and electrical layouts. Plans shall include necessary engineering features, including hydraulic reference nodes, pipe lengths and pipe diameters as required by the above named code and standards. Complete, accurate legends for all symbols and abbreviations shall be provided on plans. Drawings shall have the same scale and same sheet size used by the other trades to facilitate coordination. Sprinkler shop drawings shall be coordinated with architectural drawings for head locations. Any wall and ceiling changes occurring prior to the submittal of contractor's shop drawings shall be incorporated into the contractor's detailed design at no additional contract cost.
6. Center of tile installation is mandatory.
7. Hydraulic calculations shall be executed on standard 8-1/2 x 11 inch sheets, conforming to the requirements of NFPA 13, and shall indicate pipe numbers, beginning and end node points, all referenced Shop Drawings, and system demand curves. Calculations shall be accomplished using an approved computer program and shall be bound and indexed in a three ring binder matching "Product Submittals" and "Operating and Maintenance Manuals".

D. Product Data:

1. General: Manufacturer's specifications, data sheets, certified drawings, and installation instructions. Include physical and performance data such as weights, sizes, capacities, required clearances, performance curves, acoustical characteristics, finishes, color selection, and accessories. Include certified drawings on major equipment such as fire pumps.

E. Submit product data and brochures for, but not limited to the following:

1. Pipe Material and Fittings.
2. Pipe supports including seismic pipe supports.
3. Fire stopping, including listing system numbers and details.
4. Sprinkler heads, each type and model.
5. Spare sprinkler head cabinets.
6. Valves (all types).
7. Water measuring devices.
8. Valve cabinets.
9. Inspector's test alarm modules.
10. Pressure gauges.
11. Water flow switches.
12. Valve supervisory switches.
13. Alarm Bells.

14. Fire department connections.
15. Test header.
16. Pipe, valve and Identification signs, etc.

1.13 OPERATION AND MAINTENANCE DATA

- A. The installing contractor shall provide:
 1. All literature and instructions provided by the manufacturer describing proper operation and maintenance of any equipment and devices installed.
 2. Publication titled NFPA 25, **California 2013 Edition**, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.
- B. Include, but not limited to the following: List of all equipment with Manufacturer's name, model number, and local representative, service facilities and normal channel of supply for each item. O&M manuals shall be bound in a three (3) ring binder, with table of contents and tab set for each system. "Operation and Maintenance Manuals" to match "Product Submittals",
 1. System Description: Description of start-up and operating procedures.
 2. Controls: Diagrams and description of operating sequence of each system.
 3. Equipment: Manufacturer's brochures, ratings, certified shop drawings, lubrication charts and data, parts list with parts numbers. Mark each sheet with equipment identification number and actual installed condition.
 4. Materials and Accessories: Manufacturer's brochures parts list with part numbers and lubrication data where applicable. Mark each sheet with equipment identification number or system and location of installation; and to specifically identify which options are provided (in case where data sheet shows multiple options).
 5. Certificate of factory tests and code compliance as specified.
 6. Recommend preventive maintenance schedule and procedures.

1.14 RECORD DRAWINGS

- A. Record of Job Progress: Keep an accurate dimensional record of the "As-built" locations of all work as required. This record shall be kept up-to-date on prints as the job progresses and shall be available for inspection at all times. In addition, record drawings are to be used by the Owner's Representative for job review and field inspections.
- B. "As-Built" documentation shall be transmitted to the Owner within ten days after Owner Representative's acceptance of the completed installation. As-built documentation shall include the following (Unless noted elsewhere, furnish number of copies indicated):
 1. Two (2) copies shall be provided for each drawing. One (1) copy of final AutoCAD drawing files shall also be provided on CD disk, for each drawing.
 2. Four (4) sets of manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.
 3. Four (4) sets of hydraulic calculations and seismic bracing calculations for each sprinkler system updated to include any changes to the installations which affect the calculations.
 4. Four (4) sets of hydrostatic report and NFPA 13 material test certificate for each sprinkler system.
 5. Four (4) sets of operation and maintenance data updated to include submittal review comments and any equipment substitutions.
 6. Manufacturer's literature, reports and operation and maintenance data shall be in a labeled three (3) ring binder.

1.15 QUALITY ASSURANCE

- A. Bring to the Owner Representative's attention prior to installation, any conflicts with other trades which will result in unavoidable contact to the equipment, piping, described herein, due-to inadequate space, etc.
- B. Bring to the Owner Representative's attention any discrepancies between the specifications and field conditions, changes required due to specific equipment selection, etc., prior to installation.
- C. Provide written notification to Owner's Representative a minimum of fourteen (14) days prior to a utility shut down.
- D. Obtain inspection and approval from the Owner's Representative of any installation to be covered or enclosed prior to such closure.
- E. Restoration of Damage: Repair or replace, as directed by Owner's Representative, materials and parts of premises which become damaged as result of installation of work of this Division. Remove replaced parts from premises.

1.16 QUALIFICATIONS OF INSTALLERS

- A. Qualifications:
 - 1. Effective July 1, 2018, a certification card issued by the California State Fire Marshal is required for all fire sprinkler system pipe fitters responsible for installing, altering or repairing water based fire protection system. There must be at least one certified fitter per job site.
 - 2. For the actual installation, and testing of work under this section, use only thoroughly trained and experienced work personnel completely familiar with the items required and the manufacturer's current recommended methods of installation.
 - 3. In acceptance or rejection of the finished installation, no allowance will be made for lack of skill.
 - 4. The execution of the work shall be in strict accordance with the best practice of the trades, the intent of this specification, and all codes and ordinances.
- B. Contractor's Qualifications: A firm with at least five (5) years of successful installation experience on projects with fire protection systems work similar and of comparable size and scope to that required for this project. The installer shall have performed at least five (5) similar projects in the San Francisco Bay Area. Contractor shall be prepared to submit written evidence of the installer's experience. Installation of all sprinkler piping, and appurtenances shall be done only by a licensed, fire-protection engineering contractor with at least five (5) years' experience in designing and installing sprinkler and standpipe systems. The Contractor shall possess a valid and current State of California C-16 contractor's license, and shall have held this license under the currently-licensed business name, for a period of not less than five (5) years as of the date of bidding the project and regardless of whether any other license classification is also held. Contractor shall also be capable of providing on-site emergency service within four hours of notification. The contractor shall also be capable of providing drawings in AutoCAD 2000 version (or higher) format.
- C. Manufacturer's Qualifications: Firms regularly engaged in manufacture of fire protection products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.
- D. Products and Product Listing: All materials and equipment installed as part of this work shall be new and free of defects. All piping components, equipment, valves and other devices shall be UL listed and/or FM approved for fire sprinkler use.
- E. Welded Joints: Weld in accordance with procedures established and qualified per ANSI B31.2. Each welder and welding operator shall be qualified per the ANSI procedures as evidenced by a copy of a certified ANSI B31.2 qualification test report. Contractor shall

conduct the ANSI qualification test. Permits for on-site welding/brazing/soldering shall be obtained from DSA and/or the Authorities Having Jurisdiction.

1.17 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this section before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner's Representative.
- C. Protection of Materials:
 - 1. Protect materials, equipment and apparatus provided under this Division from damage, water, dust, or similar impairment, both in storage and installation until Notice of Completion has been filed. Materials, equipment or apparatus damaged because of improper storage or protection will be rejected and must be removed from site.
 - 2. Cap openings in pipes with manufactured caps or fittings. Do not use taped caps.
 - 3. Protect premises and work of other Divisions from damage arising out of installation of work of this Division.

1.18 GUARANTEES

- A. At completion, provide the Owner's Representative a written guarantee, in triplicate, that work has been performed in accordance with Specifications and that Contractor shall replace or repair, to the satisfaction of the Owner's Representative any portion of the work that fails within the guarantee period after final acceptance provided such failure is due to defects in materials. Also agree to replace or repair, with like workmanship and any part of the building or equipment installed by other trades but damaged by them in installing their work.
- B. During the guarantee period, make four (4) inspections of the work at three (3) month intervals after final acceptance to check the performance of systems and correct any guaranteed items. Inspections to be made in the presence of the Owner's Representative.
- C. Guarantee in writing all fire protection work for a period of twelve (12) months following date of certificate of final acceptance.
- D. All apparatus shall be built and installed so as to deliver its full rated capacity at the efficiency for which it was designed.
- E. All fire protection and electrical apparatus shall operate at full capacity without objectionable noise or vibration.
- F. The fire protection systems shall provide the performance required at standard operating conditions.
- G. Where a manufacturer's guarantee/warranty exceeds one (1) year, the longer shall govern.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. General: All pipe and fitting shall be new, acceptable to all Authorities Having Jurisdiction, conform to all applicable standards and codes, and be free from damage and distortion.

- B. Pipe shall be Black steel: Schedule 10 for 2-1/2" and larger sizes, Schedule 40 for 2" and smaller sizes. Piping outside building are galvanized steel, regardless of size.

2.2 VALVES

- A. Gate valves (Valves 2" and Smaller): MSS SP-80; UL listed and approved, 175 psi Non-shock cold water, bronze body, screw-over bonnet, threaded ends, outside screw and yoke, solid wedge, bronze trim, replaceable seat rings. Provide each valve with supervisory switch.
- B. Gate valves (Valves 2-1/2" and Larger): MSS SP-70; UL listed and FM approved, 175 psi non-shock cold water, iron body, bolted bonnet, flanged ends, outside screw and yoke, solid wedge, pre-grooved stem for supervisory switch mounting, bronze trim, replaceable seat rings. Provide each valve with supervisory switch.
- C. Butterfly valves (Valves 2" and Larger): MSS SP-67; UL listed and approved, California State Fire Marshal Listed, indicating type, gear operated, ductile iron lug type body, stainless steel stem, nickel plated ductile iron disc, Buena-N seat, 250 psi shock cold water. Provide each valve with a supervisory switch.
- D. Ball valves (Inspector's test and drain only-up to 2" max.): MSS SP-110; UL listed and FM Approved, full or standard port, two-piece bronze body construction, chrome plated solid bronze ball, blowout proof stem, and vinyl covered steel handle, 300 psi Non-shock cold water. Provide locking type handle.
- E. Check Valves (Valves 2" and Smaller): MSS SP-80; swing type check valve, screwed bonnet, horizontal swing, renewable disc, bronze body, threaded ends, 200 psi non-shock cold water.
- F. Check Valves (Valves 2-1/2" and Larger): MSS SP-71; UL listed and FM Approved, swing type check valve, bolted bonnet, horizontal swing, renewable seat and disc, iron body, flanged ends, 175 psi non-shock cold water.
- G. Check Valves: MSS SP-71; UL listed and FM Approved, swing type or wafer style silent check valve with double center guided conical spring type, 175 lb. WOG.
- H. Drain Valves and Inspector's Test Valves: UL listed, globe, straightway or angle type, ball or butterfly, bronze body, renewable disc, threaded, 150 lb. WOG, equipped with reducer and hose connection with cap or connected to a drain line.
- I. Valves install higher than 7'-0" shall be equipped with chain operators, or equivalent.

2.3 SPRINKLER HEADS

- A. The acceptable fire sprinkler head manufacturers are Tyco, Victaulic, Viking and Reliable.
- B. Exposed Structure Ceiling: UL listed, quick response pendent or upright type with brass finish, 1/2" orifice, quick response sprinkler, or equal. Chrome finish in Public Areas.
- C. In Finished Ceilings and Soffits: UL listed, quick response type, 1/2" orifice, with concealed type cover plate assembly, white finish, quick response concealed sprinkler, or equal.
- D. Temperature ratings shall be 165 degF. Exception, sprinklers at skylights and electrical room shall be 212 deg F.
- E. Sprinkler heads as shown in some spaces, may be located closer together than required by code, but are required to maintain an orderly pattern.

- F. Provide spare heads of each temperature rating and type used in a suitable metal cabinet with red enamel finish, cabinet to be located at the direction of Owner's Representative. Number of spare heads in accordance with NFPA 13.
- G. Provide sprinkler head guards, UL listed and FM approved for sprinkler heads subject to mechanical damage or for any sprinkler head lower than seven feet (7') above the floor, for all heads in all mechanical, electrical and elevator machine rooms. Head guards shall be factory painted red enamel.
- H. For sprinkler heads in exposed areas: Provide sprinkler heads with Teflon coating for corrosion resistance. All sprinkler heads exposed to the outside of the building shall be dry pendent type.
- I. Provide standard coverage heads, extended coverage sprinkler heads are not acceptable.
- J. Escutcheons shall be factory treated to receive paint.

2.4 HANGERS AND SUPPORTS

- A. Hangers and seismic sway bracing shall be designed and installed as required by NFPA 13 and NFPA 14 (including all appendices), and by the California Building Code. Provide steel bracing as to resist earthquake loads, as required for Seismic Zone IV. Specifically, these codes shall be interpreted such that all system components and supports shall be capable of resisting five times the weight of the water filled pipe plus 250 lb. downward; and 0.75 times the weight of the water filled pipe in all other directions. Flexibility, internal pressure, and differential movement between the piping and building shall be allowed for, so that no allowable stress is exceeded in any member.
- B. Hangers and components shall be U.L. listed and/or FM approved. All hanger and support components including seismic sway bracing components shall be of the same manufacturer.
- C. Hanger Rods: Hanger rod size shall be no less than the standard rod sizes listed on the MSS SP-69. Rods shall be steel rods, threaded at ends only with a minimum safety factor of 5 over the imposed load. All thread rods are not acceptable. Where rod stiffeners are required.
- D. Where beam clamps are used, provide beam clamp retaining strap.
- E. Powder-driven and explosive type fasteners are not allowed.
- F. The end sprinkler on a branch line shall be restrained against excessive vertical and lateral movement by use of a wrap-around hook or by other approved means per NFPA 13.
- G. When static pressure exceeds 100 psi, arm over and drops 12 inches and over requires a hanger.
- H. Where beam or joist thickness will not accommodate a fastener of a required length, through bolt with the required diameter of the bolt and washer will be acceptable. All thread rods are not acceptable for the required bolt.

2.5 PRESSURE GAUGES

- A. U.L. listed and labeled for fire protection sprinkler service, three inch (3") dial, 0-300 psi scale with 5 psi increments, dual range twice the system working pressure, moisture and weather resistant, 1/4" bottom connection, shut-off valve, and brass socket.

2.6 WATER FLOW SWITCHES

- A. U.L. listed, California State Fire Marshal listed, and FM Approved, vane type flow switch with retard mechanism or manual adjustment to prevent false alarm, listed for indoor/outdoor use and have tamperproof cover. Provide each with two sets of SPDT contacts and conduit connection for wiring to remote alarm system, Potter Electric Signal Co., VSR, Notifier WFD, or equal. Coordinate installation with Division 28.

2.7 SUPERVISORY (TAMPER) SWITCHES

- A. U.L. listed; California State Fire Marshal listed, and FM Approved. Switches shall be listed for indoor/outdoor use, have tamperproof cover, each with two sets of SPDT contacts and conduit connection for wiring to remote alarm system. Switches shall be Potter Electric Signal Co., OSYSU-2 or equal, for OS&Y gate valves, and PIVS-U, or equal for butterfly valves and post indicator valves. Coordinate installation with Division 28 and locate as required by Authorities Having Jurisdiction and as acceptable to the Architect.

2.8 EXTERIOR FIRE ALARM BELLS

- A. U.L. listed, California State Fire Marshal listed, and FM approved. Bells shall be listed for indoor/outdoor use, have under dome strikers and operating mechanisms and gongs on bells shall be no smaller than ten inch (10") diameter with an operating voltage of 120 VAC and shall be suitable for surface or semi-flush mounting. Outdoor surface mounted installations shall be weatherproof using a weatherproof electrical box. Otherwise bells shall mount to a standard four-inch (4") square electrical box having a maximum projection of two and one-half inches (2-1/2"). Bells shall be Grinnell Model A with A3 trim, or equal. Coordinate installation with Division 28.

2.9 PIPING IDENTIFICATION

- A. All piping are to be identified as follows: Brady Perma-Code, MSI Marking Services Inc., or equal, pressure sensitive self-sticking pipe markers consisting of pipe content wording and arrow indicating directions of flow on ANSI color background. Arrow and wording are two separate markers which shall be placed immediately adjacent to each other. Provide at each end of each marker, two and one-fourth inch (2-1/4") wide self-sticking clear tape around periphery of pipe or insulation to further secure marker. All markers shall be applied to clean surfaces free of dust, grease, oil or any other material which will prevent adhesion. Install after cleaning, painting and insulation is complete. Pipe identification shall comply with ANSI A13.1 "Scheme for the Identification of Piping Systems".
- B. Location and visibility for pipe identification:
 - 1. On all horizontal runs spaced twenty feet (20') maximum but not less than once in each room at entrance and exit of each concealed space.
 - 2. At each riser takeoff.
 - 3. Within one foot (1') of each valve and control device.
 - 4. At every change in directional flow.
 - 5. At every pipe passage through wall, floor and ceiling construction.
 - 6. Where capped piping is provided for future connections, provide legible and durable metal tags indicating symbol identification.
 - 7. At all wall and ceiling access panel/doors.
 - 8. Near major equipment items and other points of origination and termination.
 - 9. Pipe identification of sprinkler branch piping is not required.
 - 10. Attention shall be given to visibility with reference to pipe markings. Where pipe lines are located above or below the normal line of vision, the lettering shall be placed below or above the horizontal of the pipe.

C. Color Coding of Piping:

ANSI Color <u>Service</u>	Color of <u>Color Field</u>	Color of <u>Text</u>
Fire Protection Water	Red	White
Fire Sprinkler Water	Red	White

D. Size of Legend Letters:

<u>Outside Diameter of Pipe or Covering</u>	<u>Minimum Length of Color Field</u>	<u>Minimum Size of Text</u>
3/4" to 1-1/4"	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"

2.10 BURIED UTILITY WARNING AND TAPE

- A. All underground piping shall be identified with underground warning pipe markers as follows: Brady Perma-Code, Marking Services Inc., or equal, non-adhesive four (4) mil polyethylene plastic tape manufactured specifically for and identification of buried utility lines. Tape shall be of the type provided in rolls, six inches (6") width, color coded for the utility involved, with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning identification for lines shall be "CAUTION WATER LINE BURIED BELOW". Code and letter coloring shall be permanent, unaffected by moisture and other substances contained in trench backfill material.
- B. During back-filling of fire line systems, install continuous underground type plastic line markers. Run detector tape continuously along pipe and terminate in adjacent valve boxes or other suitable facilities. No splices will be allowed. Protect tape from damage during installation and backfilling. Tape that is broken, cut or crumpled shall be completely replaced. Install twelve inches (12") above the top of the respective pipe twelve inches (12") below the surface during backfill. Provide detectable type for buried non-metallic pipes.
- C. Color Code of underground tape shall be as follows:

ANSI Color <u>Service</u>	Color of <u>Color Field</u>	Color of <u>Text</u>
Fire Protection	Blue	Black

2.11 VALVE TAGS

- A. All valves shall have brass identification tag as follows: Brady Perma-Code, MSI Marking Services Inc., or equal, Brass valve identification tag secured with brass chain and "S" hook. Tags shall bear the service identification and numerical identification of the valve.
- B. Engrave identification tags with "normally open" (green) or "normally closed" (red).
- C. Tags:
 - 1. Minimum two inches (2") triangle for fire protection.
 - 2. No. 18 BS gauge brass with stamped numbers and letters filled in with black enamel paint. Engraving ink, dye and vinyl fill are not acceptable.
 - 3. Identifying number and system letter. Top line shall be 1/4" characters and should abbreviate the service. The second line shall be characters and should list the valve number. Example: 1st floor shall begin 101, second floor shall begin 201.
 - 4. Attach 6"-12" of brass jack chain around bonnet or stem of the valve in a way that it cannot accidentally come off. Attach appropriate size brass "S" hook to the chain in the most conspicuous location. Hang valve tag from the "S" hook. Valve tag should not be attached to the wheel causing interference with valve operation.
 - 5. Provide on: All valves and controls.

2.12 IDENTIFICATION

- A. Provide engraved plastic nameplates on all equipment, including but not limited to the following: Pumps (all types). Provide nameplates on each piece of equipment at disconnect and also at the breaker. Nameplates shall conform to the following, provided the equipment can accommodate the minimum sizes outlined:
 - 1. Black background with white lettering.
 - 2. Sizes: Equipment 2"x4", disconnect 1" x 2-1/2", breaker 1" x 3".
 - 3. Lettering shall be 3/4" (1/4" minimum or sized for the maximum per nameplate.
 - 4. Nameplate shall be provided with both adhesive backing and screw holes to insure permanent application.
 - 5. Material shall be 2 ply 1/16" thick with beveled edges.
- B. Properly identify each piece of equipment and controls pertaining thereto by nameplates mounted on equipment and controls using round head brass machine screws, pop rivets or contact cement. Cardholders in any form not acceptable. Install with corrosion resistant mechanical fasteners and adhesive and seal with clear lacquer.
- C. Place warning signs on machines driven by electric motors which are controlled by fully automatic starters, in accordance with Article 3281, General Industry Safety Orders.
- D. Small devices, such as inline pumps, may be identified with tags.
- E. Identify control panels and major control components outside panels with plastic nameplates.
- F. Identify equipment out of view behind access doors, in unfinished rooms on the face of the access door.

2.13 VALVE AND EQUIPMENT CHARTS

- A. Provide five typewritten schedules giving numbers, service and locations, and notations of open or closed, of all tagged valves. Enclose each schedule in separate transparent plastic binder. List piping systems with symbol and color coding on pipe identification chart. List valve model numbers and symbol for service corresponding to piping symbol on valve identification chart. Provide small "key plan" identifying valves as related to column lines. Schematic flow diagrams of each piping system indicating:
 - 1. Location and function of each tagged valve.
 - 2. Type, size and essential features of each system.

- B. Submit drafts of valve schedule for review before preparing final sets.

2.14 IDENTIFICATION SIGNS

- A. Provide systems with identification signs as specified and as required by NFPA 13, NFPA 14 and any other code requirements.
- B. Fire sprinkler signs shall be made of 18-gauge minimum baked enamel aluminum and meet NFPA 13. Signs shall be printed red on white background or white on red background. Each sign shall have holes or slots to facilitate field attachment. All signs shall be secured by the use of tamper-resistant screws.
- C. Provide identification signs in accordance with referenced standards, to include, but not be limited to: the fire department connection(s), each control valve, each main or auxiliary drain valve, each inspector's test valve, and, for hydraulically-designed systems, a hydraulic system calculation nameplate. In addition, provide signs identifying all access panels concealing sprinkler control or test valves. Provide a sign on or directly below the local water flow alarm.
- D. A permanently installed, metal calculation plate shall be attached at the sprinkler riser indicating sprinkler specifications as required by NFPA 13. Use of plastic tape shall not be permitted on the calculation plate.
- E. Approved identification signs shall be provided for outside alarm devices such as bells, etc. The sign shall be located near the device in a conspicuous position and shall be worded as follows: "SPRINKLER FIRE ALARM - WHEN BELL SOUNDS CALL 911".

2.15 SLEEVES AND ESCUTCHEONS

- A. Sleeves: Provide sleeves for all pipes passing through slabs, concrete walls, lath and plaster ceilings (except drop nipples for sprinklers) and partitions. Sleeves shall extend three inches (3") above floors and be flush with walls, ceilings, and partitions. In concrete construction, sleeves shall be set in forms prior to pour. Clearance between sleeves and pipes shall be one inch for pipes up to three and one-half inches two inches (2") for pipe sizes four inches (4") and greater, and three inches (3") for seismic joints.
- B. Sleeve Materials:
 - 1. In concrete slabs and walls: Schedule 40 black steel pipe.
 - 2. Sleeves through waterproof membranes: Sleeves set in walls and slabs may be either cast iron or steel and shall be provided with a flashing clamp device and corrosion resistant clamping bolts.
- C. Escutcheons: Primer-coated steel set-screw type.

2.16 IDENTIFICATION SIGNS

- A. Seals shall be modular type consisting of interlocking synthetic rubber links shaped to continuously fill the space between the pipe and the opening, zinc galvanized plated bolt and nut, Thunderline Corporation "Link-Seal", Calpico Model CSL Pipe Linx, or with "Link-Seal" WS series steel wall sleeve.

2.17 ACCESS PANELS AND DOORS

- A. Furnish under this Division where shown, and required by Regulatory Agencies and for access of all concealed valves, etc. Doors in this Division shall be from same manufacturer

as those specified under Section 08 31 16 for identical appearance and keying. Sizes: 24" x 24" inches minimum for ceilings and 12" x 12" minimum for walls. Furnish fire rated doors when located in rated walls and ceilings. Deliver doors for installation under Section 08 31 13. Mark each door to accurately establish its location.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Sprinkler heads in all finished areas shall be installed on a true axis line in both directions with a maximum deviation from the axis line of plus or minus 1/2 inch. At the completion of the installation, if any heads are found to exceed the above-mentioned tolerance, such heads shall be removed and satisfactorily reinstalled. In areas with ceiling tiles, sprinklers shall be installed in center of tiles.
- B. Locate pipe and sprinkler heads fully coordinated with the engineered diffusers, reflected ceiling plans, ducts, conduits, light fixtures, curtain tracks and all other ceiling elements. Maintain proper code clearances from all ceiling obstructions.

3.2 GENERAL INSTALLATION

- A. Light fixtures and other potential obstructions shall not interfere with the engineered spray patterns of sprinkler heads.
- B. Supervisory Switches: For each indicating valve, sprinkler system riser, sprinkler zone, standpipe system riser, main service entrance, and control valve provide a supervisory switch that is connected to the fire alarm system. Standpipe hose valves and test and drain valves shall not be provided with supervisory switches.
- C. Water flow Switches: For each sprinkler zone, each standpipe riser and where indicated on drawings, provide a water flow switch. Install water flow switch and adjacent valves in easily accessible locations.
- D. System valves and gauges shall be accessible for operation, inspection, tests; and maintenance.
- E. No valve and no piece of equipment or trim shall support the weight of any pipe.
- F. Provide a pressure gauge on the system side of all control valves, at the top of each sprinkler or standpipe riser.
- G. No cutting, drilling or taping of structural members shall be done without prior written approval of the Owner Representative.
- H. Powder actuated fastening will not be allowed. Embeds, beam clamps, or drilled fasteners will be required, unless otherwise noted.
- I. Provide hydraulic design information signage as required by NFPA 13 and 14.
- J. Install access doors in ceilings of rooms where above ceiling access is required.
- K. Prepare all piping having welds for Fire Marshal inspection prior to installation.

3.3 PIPING INSTALLATION

- A. Carry all exposed and concealed horizontal lines of pipe on specified hangers properly spaced and set to allow the pipe to adjust for expansion and contraction.
- B. Check all piping runs beforehand with all other trades. Run piping to maintain proper clearance for maintenance and to clear opening in exposed area. Run piping in strict coordination with mechanical piping, ducts, and equipment, plumbing work, all electrical conduit and equipment, structural, and architectural conditions. All piping shall be installed within designated finished ceiling height as noted on the architectural drawings.
- C. Install all exposed piping to or at right angles with building walls and tight to walls or ceilings wherever possible. Piping shall be arranged to form a symmetrical pattern. Horizontal piping shall be supported at intervals not to exceed spacing permitted by NFPA 13 & 14. Vertical risers shall be supported at the base and at each floor level with clamps and hangers.
- D. Provide sleeves wherever pipes are run through walls, footings, and slabs, to allow large enough openings for the passage of the pipe. Set sleeves in forms before concrete is poured. Sleeve size shall be not less than a nominal diameter two inches (2") larger than the nominal diameter of piping three and one-half inch (3-1/2") and smaller, and a nominal diameter four inches (4") larger than the nominal diameter of piping four inches (4") and larger. The space between each pipe and sleeve shall be completely closed by packing with code approved mineral fiber materials with a suitable binder or other approved packing material. Piping through rated walls and floors shall be sealed with UL fire rated fireproof material, all in accordance with Fire Marshal's requirements. Pipes through underground exterior walls shall be sealed watertight. Provide link seal protection at sleeves in underground exterior walls and as noted on the drawings.
- E. Fire stop all pipes penetrating fire rated construction in with specification Section 07 84 13, Penetration Firestopping.
- F. Where exposed pipes pass through walls, ceilings, or floors, provide escutcheon plates in all finished rooms and conspicuous locations. Escutcheon plates must be securely held in position allowing enough clearance to allow for expansion and shall be sufficient size to cover the opening around the pipe.
- G. Support all pipe from the building structure so that there is no apparent deflection in pipe runs. Fit piping with steel sway braces and anchors to prevent vibration and/or horizontal displacement under load when required. Do not support pipe from or brace to ducts, other pipes, conduit, or any materials shown on the Drawings. Piping or equipment shall be immobile and shall not be supported or hung by wire, rope, plumber's tape or blocking of any kind.
- H. Arrange riser and piping to maintain minimum clear width at stairways of forty-four inches (44") and minimum headroom of seven feet six inches (7'-6") for all piping.
- I. Do not run piping through elevator hoist way, machine rooms, machinery spaces and enclosures unless piping is serving these spaces. Branch sprinkler piping serving these spaces shall be provided with a supervised branch shut-off valve and flow switch located at an accessible location outside these spaces. Provide supervisory switch on the branch shut-off valve.
- J. Do not run piping through stairways, vaults, electrical rooms and other electrical or electronic equipment spaces and enclosures unless piping is serving these spaces.
- K. Sprinkler piping shall not be installed within the vertical space above electrical switchboards, panel boards, distribution boards, or battery charging panels (refer to California Electrical Code).
- L. Clean pipe and fittings and keep interiors clean throughout installation. Provide caps on ends of cleaned piping.

- M. Use full pipe lengths; random lengths joined by couplings will not be accepted.
- N. Provide allowance for expansion and contraction of all pipes and for seismic movement.
- O. Provide reducing fittings for all changes in pipe size; provide fittings for all changes in pipe direction. Riser piping shall be installed plumb with offset fittings used where alignment adjustment is necessary.
- P. Provide unions for pipe sizes smaller than two inches (2") and flanged or grooved fittings for sizes two inches (2") and larger to permit.
- Q. Provide dielectric fittings where dissimilar piping materials are joined.
- R. Piping arrangement shall avoid beams, columns, ducts, lighting fixtures, doors, windows, and similar obstructions and openings.
- S. Drains, Test Pipes and Accessories: Provide a drain at the base of risers, drain connection on valved sections, and drains at other locations for complete drainage of the system. Provide valve in drain lines and connect to central drain riser. Discharge riser outside over splash block, indirectly over an approved indirect waste receptor as furnished by plumbing section, or as indicated. The main drain shall be capable of discharge test without allowing water to flow onto the floor. If over an indirect waste receptor, verify that receptor is adequately sized to handle flow discharge rate.
- T. Install auxiliary drain valves for lines in accordance with NFPA 13.
- U. The inspector test valve and piping shall be installed in accordance with NFPA 13, and provided at conveniently accessible locations and shall be supplied from the hydraulically remote point. A sight glass with built-in orifice of the appropriate size shall be installed adjacent to each valve. Discharge shall be to the main or to the outside. Location will permit the valve to be opened wide for sufficient time for testing without causing water damage.
- V. The discharge area for the main drain and inspector's test valve shall be protected with a concrete splash pad to prevent damage to landscaping during periodic testing.

3.4 INSTALLATION OF EXTERIOR FIRE ALARM BELLS

- A. The bell shall be located on the face of the protected building adjacent to the fire department connection with a mounting height of eight feet (8') to ten feet (10') above finish grade. The bell shall be connected to one of the two sets of contacts on the building flow switch, with power supplied from a dedicated 120 VAC circuit other than that supplying power to the building fire alarm control panel, served by emergency or standby power source (if the building is so equipped). All wiring shall be in conduit, concealed in interior locations.

3.5 FLUSHING, TESTING, AND ADJUSTING

- A. Test automatic sprinkler system in accordance with NFPA 13.
- B. Perform tests in the presence of authorities having jurisdiction. Provide required labor, materials, equipment and connections and submit results for review. Repair or replace defective work and pay for restoring or replacing damaged work, due to tests, as directed.
- C. All equipment required for testing, including fittings for additional operating shall be provided by the Contractor.
- D. System Piping Flushing: Underground mains and lead-in connections to system risers shall be completely flushed before connection is made to sprinkler piping. The flushing operation

shall be continued for a sufficient time to ensure thorough, cleaning. The minimum flow rate shall be not less than the hydraulically calculated water demand rate of the system including: hose requirements, or a flow necessary to provide a velocity of not less than ten (10) feet per second, or the maximum flow rate available to the system under fire conditions. After fire sprinkler piping installation has been completed and before piping is placed in service, flush entire sprinkler system, as required to remove foreign substances, under pressure as specified in NFPA 13 and NFPA 24. Continue flushing until water is clear, and check to ensure that debris has not clogged sprinklers. While conducting the flushing operation, the contractor shall exercise care that the water does not create any damage. The contractor shall be responsible for any damage caused by this operation.

- E. Hydrostatic Testing: After flushing system, test fire sprinkler piping hydrostatically as required by NFPA 13 but not less than for period of two (2) hours at two-hundred (200) PSIG, or at fifty (50) PSI above maximum static pressure if it is greater than one hundred-fifty (150) PSI. Check system for leakage of joints. Measure hydrostatic pressure at low point of each system or zone being tested.
- F. Repair or replace piping system components as required to eliminate leakage.
- G. Water remaining in normally dry piping shall be evacuated at completion of testing.
- H. All water level sensors, alarm and supervisory signals, tanks and automatic valves shall be performance tested.
- I. The inspection, hydrostatic test and flushing of the sprinkler system shall be witnessed by the Authority Having Jurisdiction, and Owner Representative.
- J. Provisions shall be made for the proper disposal of water used for, flushing or testing.
- K. Provide complete adjustment of sensitivity of water flow and supervisory (tamper) switches. Coordinate with Division 28 Contractor.
- L. After the inspection has been approved, the Contractor shall certify in writing the time, date, name and title of the person reviewing the test. This shall also include the description and what portion of the system has been approved.
- M. A complete record shall be maintained of all testing that has been approved, and shall be made available at the job site.
- N. Upon completion of the work, all records and certifications approving testing requirements shall be submitted to the Owner Representative and before final payment is made.
- O. Defective work or material shall be replaced or repaired, as necessary, and the inspection and test repeated, all at Contractor's cost. Repairs shall be made with new materials.
- P. No part of any work shall be covered until after it is inspected, tested, and approved.

3.6 INSPECTION

- A. After completion of the fire protection installation and at the start of the guarantee period, execute the National Automatic Sprinkler and Fire Control Association, Inc. standard of Inspection Agreement, at no increase in Contract Sum, calling for four (4) inspections of the sprinkler system during the guarantee year (see "Guarantees"), plus the following maintenance to be performed during the course of the fourth inspection:
 - 1. Operating of all control valves.
 - 2. Lubrication of operating stems of all control valves.
 - 3. Operating of electrical alarms.
 - 4. Cleaning of alarm valves.

5. Lubrication of Fire Department hose connection inlets.
6. Main drain test.

- B. Fill out Inspection Agreement in triplicate after each inspection and send copies to the Owner Representative.

3.7 PROTECTION, CARE, AND CLEANING

- A. Provide adequate means for, and fully protect, all finished parts of the materials and equipment against physical damage from whatever cause during the progress of this work and until final completion.
- B. During construction, properly cap all lines and equipment nozzles so as to prevent entrance of sand, dirt, etc. Protect equipment against moisture, plaster, cement, paint or other work of other trades by covering it with polyethylene sheets.
- C. Thoroughly clean exterior and interior of piping, equipment, and materials before systems are put into operation. All systems of any nature shall be thoroughly cleaned and flushed of all pipe contaminants such as cuttings, filings, lubricant, rust, scale, grease, solder, flux, welding residue, debris, etc. Any piece of equipment or part of any system which malfunctions or is damaged due to failure or neglect on the part of this Division to observe this paragraph shall be repaired or replaced to the satisfaction of the Owner's Representative by and at the total expense of this Contract.
- D. After installation has been completed, clean all systems.
 1. Piping and Equipment: Clean exterior thoroughly to remove rust, plaster, cement, and dirt before insulation is applied.
 2. Piping and Equipment to Be Painted: Clean exterior of piping, and equipment, exposed in completed structure, removing rust, plaster, cement and dirt by wire brushing. Remove grease, oil, and similar materials by wiping with clean rags and suitable non-toxic solvents. Touch up primer coat as required.
 3. Motors, Pumps and Other Items with Factory Finish: Remove grease and oil, and leave surfaces clean and polished.
 4. Chrome or Nickel Plated Work: Thoroughly polish.
 5. Factory Finished Items: Remove grease and oil and leave surfaces clean and polished.
 6. All code stamps and nameplates shall be protected from damage and must be and legible before final inspection.

3.8 PAINTING AND IDENTIFICATION

- A. After completion of hydrostatic tests, all system piping exposed to view in or on the building shall be painted in accordance with Section 09 91 00 - Painting.
- B. All valve hand wheels shall be painted red enamel.
- C. Provide pipe, valve, and equipment identification; and signage in accordance with referenced codes and specifications.

3.9 ACCESSIBILITY

- A. The installation of valves, gages, control devices or other specialties requiring reading, adjustment, inspection, repairs, removal or replacement shall be conveniently and accessibly located with reference to the finished building.

3.10 CLOSING IN OF WORK

- A. Do not allow or cause any work to be covered up or enclosed until inspected, tested and approved.

3.11 EMERGENCY REPAIRS

- A. The Owner reserves the right to make temporary repairs as necessary to keep equipment in operating condition without either voiding the guarantee bond nor relieving the Contractor of their responsibility during the bonding period.

3.12 CLEANING UP AND REMOVAL OF SCRAP

- A. All trash and scrap shall be cleaned up and removed from the site as the work progresses.

3.13 PRELIMINARY OPERATIONS

- A. The Owner reserves the right to operate portions of the mechanical system on a preliminary basis without voiding the guarantee.

3.14 TRAINING

- A. Provide instruction to the Owner with regard to proper use and operation of the system. Training shall include both classroom and "hands-on" sessions and shall occur after final inspection and testing. Location and timing of the training session is to be arranged with the Owner's Representative.
- B. Two weeks prior to scheduled training dates, furnish the Owner's Representative with six (6) bound copies of complete instructions, including catalog cuts, diagrams, drawings, and other descriptive data covering the proper testing, operation, and maintenance of each type of system installed, and the necessary information for ordering replacement parts. In addition, post one (1) copy of complete instructions at the control panel location.
- C. Session shall include detailed training and instructions covering the necessary and recommended testing, operating, and maintenance procedures for each type of system. Session shall include training and instructions covering the emergency operation procedures for each type of system.

END OF SECTION

06/08/18

SECTION 22 47 13
DRINKING FOUNTAINS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes drinking fountains and related components.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Sections:
 - 1. Section 02 41 19 – Selective Demolition: Removal of existing drinking fountain.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of drinking fountain.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include operating characteristics, and furnished specialties and accessories.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For drinking fountains to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 DRINKING FOUNTAINS

- A. Drinking Fountains: Painted steel, pedestal, wheelchair accessible.
 - 1. Steel Drinking Fountains:
 - a. Manufacturers: Subject to compliance with requirements, provide products by the following; or equal:
 - 1) Haws Corporation; Model 3300 "Hi-Lo."
 - 2. Basis-of-Design Product: Model 3300 "Hi-Lo" barrier-free pedestal drinking fountain shall include an 11 gauge galvanized substrate steel pedestal with green powder-coating, polished stainless steel basins, push-button operated stainless steel valves with front-accessible cartridge and flow adjustment, polished chrome-plated brass vandal-resistant shielded bubbler head, 100% lead-free waterways, polished chrome-plated vandal-resistant waste strainers with top-down clean-out access, vandal-resistant access plates, integral mounting feet, and 1-1/2" slip waste.

- B. Construction: Barrier-free design made of heavy-duty 11 gauge galvanized steel with green powder-coat finish. Unit has a high-polished stainless steel basin that resists stains and corrosion, recessed push-button, welded bubbler guard, and vandal-resistant bottom plate.
 - 1. Supply Piping: NPS 1/2" IPS with shutoff valve.
 - 2. Drain Piping: NPS 1-1/2" minimum trap and waste.
- C. Drain Clean-Out: Top-down access to the drain allows the fountain to be cleaned without taking the unit apart, good for outdoor settings with drain-clogging sediment such as leaves, garbage, and other debris.
- D. Barrier-Free: Barrier-free capabilities combined with its ease of use allows for a number of installation location possibilities.
- E. Bubbler Head: Polished chrome-plated brass bubbler head with integral basin shank for added strength. Shielded, angled stream opening provides a steady, sanitary source of drinking water at 0.45 gpm.
- F. Push Button Valve: The push-button activated valve has an all stainless steel body, with chrome plated brass push button assembly which allows for front access to water stream adjustment, water control cartridge, and water supply strainer replacement without having to go through the bottom plate. Operating pressure range of 30 to 90 psi.
- G. Standards Compliance:
 - 1. Model meets all current Federal Regulations for the disabled including those in the Americans with Disabilities Act.
 - 2. Drinking fountain to be lead-free by all known definitions including NSF/ANSI Standard 61, Section 9, NSF/ANSI 372, California Proposition 65, and the Federal Safe Drinking Water Act.
 - 3. Product is compliant to California Health and Safety Code 116875 (AB 1953-2006).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.
- B. Examine exterior concrete paving for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install fixtures level and plumb according to roughing-in drawings. For fixtures indicated for children, install at height required by authorities having jurisdiction.
- B. Set pedestal drinking fountains on exterior concrete pavement.
- C. Install water-supply piping with shutoff valve on supply to each fixture to be connected to domestic-water distribution piping. Use ball or gate valve. Install valves in locations where they can be easily reached for operation.
- D. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.

- E. Seal joints between fixtures and exterior concrete pavement using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 07 92 00 "Joint Sealants."

3.3 CONNECTIONS

- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Comply with water piping requirements specified in 2016 California Plumbing Code.
- C. Install ball or gate shutoff valve on water supply to each fixture.
- D. Comply with soil and waste piping requirements specified in 2016 California Plumbing Code.

3.4 ADJUSTING

- A. Adjust fixture flow regulators for proper flow and stream height.

3.5 CLEANING

- A. After installing fixtures, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
- B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.
- C. Provide protective covering for installed fixtures.
- D. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION

06/06/18

SECTION 23 05 00

GENERAL MECHANICAL PROVISIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The General Conditions, Special Conditions, and Division 1 - General Requirements, are hereby made a part of this Section as if repeated herein.
- B. These General Mechanical Provisions apply to the entire Division 23.

1.2 DESCRIPTION

- A. Work Included: Furnish all labor, materials, equipment and pay all fees required to complete all plumbing work shown on the drawings and specified herein.
- B. Related work included in other sections:
 - 1. Electrical.
 - 2. Painting.
 - 3. Access Panels.
 - 4. Concrete Work.
 - 5. Landscape Irrigation.
 - 6. Site Work.

1.3 INCORPORATED DOCUMENTS

- A. Published specifications, standards, tests or recommended methods of trade, industry or governmental organizations apply to work of this Section, including those noted below:
 - 1. Associated Air Balance Council (AABC).
 - 2. Air Diffusion Council (ADC).
 - 3. American Gas Standard (AGA).
 - 4. Air Moving and Conditioning Association (AMCA).
 - 5. American National Standards Institute (ANSI).
 - 6. Adhesive and Sealant Council (ASC),
 - 7. American Society of Mechanical Engineers (ASME).
 - 8. American Society for Testing and Materials (ASTM).
 - 9. Air Conditioning and Refrigeration Institution (ARI).
 - 10. American Society of Civil Engineers (ASCE).
 - 11. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).
 - 12. National Environmental Balancing Standards (NEBB)
 - 13. National Electrical Manufacturers Association (NEMA).

14. National Fire Protection Association (NFPA).
15. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
16. Underwriters' Laboratories, Inc. (UL).

1.4 LEGAL REQUIREMENTS AND STANDARDS

- A. General: Comply with applicable sections of state and local codes, laws ordinances, rules and regulations of authorities having jurisdiction.
- B. Codes and Standards: Conform to applicable sections of codes and standards, including:
 1. California Energy Conservation Code, Title 24.
 2. Occupational Safety and Health Administration (OSHA).
 3. State Fire Marshal requirements.
 4. California Electrical Code (CEC).
 5. California Building Code (CBC).
 6. California Mechanical Code (CMC).
 7. California Plumbing Code (CPC).
 8. Division of the State Architect (DSA).
- C. Minimum Requirements:
 1. Comply with requirements of authorities as minimum acceptable work.
 2. The drawings and specifications take precedence when they call for materials or construction of better quality or larger size than required by codes, laws, rules and regulations.

1.5 DEFINITIONS

- A. Exposed: Piping, ductwork, and equipment exposed to view in finished rooms, or completed work.
- B. Option or Optional: Contractor's choice of an alternate material or method.
- C. Install: To physically erect, mount and connect complete with related accessories.
- D. Supply: To purchase, procure, acquire and deliver complete with related accessories.
- E. Furnish or Provide: To supply, install, and connect up complete and ready for safe and regular operation of particular work referred to, unless specifically noted otherwise.
- F. Work: Labor, materials, equipment, apparatus, controls, accessories, and other items required for proper and complete installation.
- G. Wiring: Raceway, conduit, fittings, wire, boxes, and related items.
- H. Concealed: Embedded in masonry or other construction, installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces, or in enclosures, and not exposed to view in the completed work.
- I. Reviewed, Satisfactory, Accepted, or Directed: As reviewed, satisfactory, accepted or directed, by or to Engineer.

- J. Motor Controllers: Manual or magnetic starters (with or without switches), individual pushbuttons or hand (HOA) switches controlling the operation of motors.
- K. Control or Actuating Devices: Automatic sensing and switching devices such as thermostats, pressure, switches and relays, etc., controlling operation of equipment.
- L. Indicated, as Shown, or Noted: As indicated, shown or noted on Drawings or Specifications.
- M. Similar or Equal: Of base bid manufacturer, equal in materials, weight, size, design and efficiency of specified product.
- N. Engineer: Mechanical Engineer of Record.
- O. Accessible: Capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as motors, fans, pumps, belt guards, transformers, high voltage lines, piping, and ductwork.

1.6 SITE EXAMINATION

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirement of the contract. Compare site and existing conditions to the mechanical, electrical, architectural, structural, civil, and other drawings and specifications. Call any discrepancies to the attention of the Architect during bidding period. Make allowances for them in preparing the bid.

1.7 ELECTRICAL WORK

- A. Quality: Work shall comply with requirements of Division 26 and applicable codes.
- B. Wiring: all wiring shall be in electrical conduit or as indicated on drawings.
- C. HVAC Control Wiring: Provide control wiring for starter holding coils, relays, interlock and temperature controls.
- D. Provide controls, controllers, relays, transformers, switches, duct mounted products of combustion detectors, time clocks, etc., required by work of this Division.

1.8 SUBSTITUTION OF MATERIALS:

- A. The design has been based on the manufacturer's name and product listed on the drawings or named first in these specifications. Other manufacturers' names listed in these specifications may be selected and considered "as equal" for quality only; however, they must match the performance, construction, fit and features of those selected for design. The acceptance of these does not relieve the Contractor for responsibility of providing the required materials and providing a workable system.
 - 1. In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "SPECIFIED ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION".
 - 2. It shall be the Contractor's responsibility to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and the submittal will not be allowed.

- B. Should the contractor wish to substitute equipment or material other than those considered for the basis of design, the contractor shall submit information as called for in "Submittal of Materials and Equipment" for both the specified or scheduled item and the substitute item. These submittals will show that both the specified and the substitute material match in quality, performance, construction, fit and features of those selected for design. Any equipment or material submitted for substitution without the comparison information will not be reviewed or acceptable.
- C. Liability of Substitutions:
1. Performance of substitutions must be equal to the item specified. If the substituted item fails to perform according to the specifications, replace with the originally specified item without extra compensation on request of the Architect any time within the guarantee period.
 2. The contractor is responsible for the cost of any changes to other trades and additional Architectural and Consulting fees resulting from approved substitutions in mechanical equipment.
 3. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
 4. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.

1.9 SUBMITTAL OF MATERIALS AND EQUIPMENT

- A. Submittal:
1. Submittals for a product or material or area of work must be complete. **PIECEMEAL SUBMITTAL WILL NOT BE ACCEPTABLE.** All submittals shall be factory or manufacturer certified. Vendor's submittal data not acceptable.
 2. Have all product data sheets clearly labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
 - a. Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
 - b. Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, page and item numbers.
 3. Identify submittal with Architect's project name, number and with item designation as indicated on drawings, and referenced to applicable paragraphs of the specification. Submit in brochure form.
- B. Review of Submittal: These will be reviewed for general design only, and not for method of assembly, erection, construction, or detailed compliance with contract documents. All submittals shall be factory or manufacturer certified. Submittal technical data and dimensions by Vendor are not acceptable.
- C. Manufacturer's Data:
1. Include data for all material and equipment that will be installed.

2. Include complete catalog information such as construction, capacities, types, fan curves, pump curves, sizes, etc. Also include dimensional data, and sufficient information to illustrate compliance with the specifications and list labeling and/or approving agencies and standards of design employed in manufacturer data.

D. Shop Drawings:

1. Prepare dimensionally accurate floor plans and Sections in tight conditions as required of all equipment rooms and all floor plans. Show all equipment, complete ductwork, piping (including plumbing and sprinkler pipes), accessories, and also clearances for operating servicing and coordination with other systems. Indicate bottom elevation for both pipes and ductwork.
2. Automatic temperature control systems, wiring diagrams, control panel boards. Include in wiring diagrams all low and line voltage wiring and equipment.
3. Drawings clearly identified with the Architect's project name and number, and a sheet title identifying its contents.
4. Show location of thermostat(s) and sensors.

1.10 RECORD DRAWINGS (AS-BUILT DRAWINGS)

- A. Contractor shall provide and keep up-to-date a complete and accurate "as-built" record set of blue line prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. This record shall be kept up-to-date on blue line prints as the job progresses and shall be available for inspection at all times. Submit completed drawings to Architect in compliance with Division 1.

B. Include on as-built drawings:

1. Main shut-off valves, plainly marked and identified.
2. Position of all buried or concealed mains accurately dimensioned, both horizontally and vertically.
3. Changes in location of piping, duct or equipment from construction documents. Bottom elevations of each duct and pipe.
4. Ceiling and duct access panel locations.
5. Location of temperature control devices including static pressure control probe, stats, selected zones, etc.
6. Location of all equipment.
7. Invert elevation of sewer and storm drain pipe below grade.

1.11 OPERATING AND MAINTENANCE DATA

- A. General: Submit to the Architect before acceptance of the installation, complete and at one time. Partial or separate data will not be accepted. Data shall consist of the following minimum submissions:

1. Piping Identification Schedule: Copy of charts as specified under valve tags and charts.
2. Simplified and consolidated control drawings.
3. Equipment: List of nameplates, including nameplate data and system served.

4. Manufacturer's Literature: 3 copies of manufacturer's instructions for operation and maintenance of all mechanical equipment, including replacement parts list.
5. Written Instructions: Typewritten instructions for operation and maintenance of these systems composed of Operating Instructions and Maintenance Schedule. 4 copies submitted to the Engineer for approval.
6. Operating Instructions: A brief description of the system indicating proper setting of switches and other equipment furnished for providing control of the system and its components by the operator. Do not include adjustments requiring the technical knowledge of the service agency personnel.
7. Maintenance Instructions: A list of each item of equipment requiring inspection or lubrication, describing the performance of such maintenance, and the month of the year when each item of equipment should be inspected, serviced, or lubricated.
8. Maintenance Schedule: A list of each item of equipment requiring maintenance, showing the exact type of bearing on every component of each item of equipment, and the frequency when each item of equipment should be inspected or serviced.
9. Verbal Instructions: Upon completion of the work, and at a time designated by the Architect, instruct the Owner's representative in the operation and maintenance of the equipment supplied by his company.
10. Binders: Four complete sets of the above data in loose ring binders with permanent covers, with permanent identification on back and index.

1.12 QUALITY ASSURANCE

A. Products Criteria:

1. Supply all equipment and accessories new, free from defects.
2. Supply all equipment and accessories in compliance with the applicable standards listed in Article 1.4 of this sections and with all applicable national, state, and local codes.
3. Electrical Equipment: Listed by UL and shall bear their label.
4. Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 3 years. See other specification sections for any exceptions.
5. Products shall be supported by a service organization that maintains a complete inventory of repair parts and is located reasonably close to the site.
6. When two or more units of materials or equipment of the same type or class are required. These units shall be products of one manufacturer.
7. Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
8. Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.
9. Asbestos products or equipment or materials containing asbestos shall not be used.
10. Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the Owner prior to installation. Installation of the item will not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

- B. Qualifications of Installers: For the actual fabrication, installation and testing of work under this Section, use only thoroughly trained and experienced workmen completely familiar with the items required and the manufacturer's current recommended methods of installation.
- C. Before any welding is performed, submit a copy of the Welding Procedure Specification (WPS) together with the Procedure Qualification Record as required by Section 9 of the ASME Boiler and Pressure Vessel Code.
1. Before any welder performs any welding, submit a copy of the Manufacturer's Record of Welder or Welding Operator Qualification Tests as required by Section 9 of The ASME Boiler and Pressure Vessel Code. The letter or symbol (as shown on the qualification test form) shall be used to identify the work of that welder and shall be affixed in accordance with appropriate construction code, to each completed weld.
 2. The types and extent of non-destructive examinations required for pipe welds are shown in Table 136.4 if the Code for Pressure Piping, ANSI/ASME.
- D. Requirements of Regulatory Agencies and Standards:
1. Permits: Obtain and pay for all fees, permits and inspections. Deliver all certificates of inspection to Architect [IOR].
 2. Arrange and pay all costs for utilities required to complete all work of this Division. Connection to all utility company or on-site services, payment of service charges and provision for and installation of temporary utilities is included.
 3. The requirements of authorities shall be minimum acceptable requirements for the work. When contract drawings or specifications call for materials or construction of better quality for larger size than required by codes, laws, rules and regulations, the drawings and specifications take precedence.
- E. Drawings:
1. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. All scaled and figured dimensions are approximate and are given for estimating purposes only. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, traps, and other devices that may be required to complete the installation. Before proceeding with any work, carefully check and verify all dimensions and sizes.
 2. As far as possible the work has been indicated on the drawings in such position as to suit and adapt to the work of other trades, but the work as indicated is largely diagrammatic and shown primarily for clarity. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the work of all other trades prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown.
 3. When apparatus and equipment have been indicated on the drawings, dimensions have been taken from typical equipment of the class indicated. The locations of apparatus, piping, and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
 4. Where equipment is furnished by others, verify dimensions and the correct locations of this equipment before proceeding with the rough-in of connections.
 5. Be responsible for any cooperative work which must be altered due to lack of proper supervision or failure to make proper provision in time. Such changes shall be directly supervised by the Architect and made to his satisfaction.

6. Special Note: Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the architect may permit the installation to remain. However, all costs incurred to revise the contract drawings by the engineer for submittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.

1.13 SHOP, OFFICE AND STORAGE

- A. Provide temporary shop, office and storage space on site only at locations approved by Architect, as required for execution of work. Remove these facilities upon completion of work.

1.14 JOB CONDITIONS

- A. Where new pipes are to be connected to an existing pipe, verify location, size, elevation and all other information necessary for connection. This verification shall be done prior to installation of the new pipe. Should there be a problem, contact the Architect [IOR] immediately to resolve the problem.
- B. Interruption of Services:
 1. Before making any connections or doing any work which interrupts services to existing buildings, notify Owner in writing at least 72 hours in advance; and such work performed as quickly as possible and only at such times as designated by Owner.
 2. Length of time existing services is shutdown to be approved by Owner.
- C. Restoration of Damage: Repair or replace, as directed by Architect, materials and parts of premises which become damaged because of installation of work of this Division. Remove replaced parts from premises. Keep accumulation of dust and debris to a minimum. Remove and dispose of debris in a legal manner. Burning and/or selling material at the site is prohibited.
- D. Cleaning Equipment and Premises:
 1. Clean equipment and materials: Remove all dirt, grease, splashed paint, plaster and similar foreign materials. Restore damaged finishes to original condition.
 2. Site Cleaning: Remove from site all packing cartons, scrap materials and other rubbish resulting from operations.

1.15 REVIEW OF CONSTRUCTION

- A. Work may be reviewed at any time by representatives of Owner or representatives of Architect.
- B. Advise Architect that work is ready for review at following times:
 1. Prior to backfilling buried work.
 2. Prior to concealment of contract have been completed.
 3. When requirements of contract have been completed.

- 4. Do not backfill or conceal work without Architect's consent.
- C. Maintain on job a set of specifications and drawings for use by Architect's representative.
- D. Noncompliance: Should any of the work be covered up or enclosed prior to all required inspections and approvals, uncover the work as required and, after it has been completely inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Architect and at no additional cost to the Owner.

1.16 MATERIALS

- A. In addition to material and equipment specified, also provide incidental materials required to effect complete installation. Such incidental materials and equipment shall be uniform throughout the installation. Equipment or fixtures of the same type shall be of same manufacturer.
- B. Protection of Materials:
 - 1. Protect materials, equipment and apparatus provided under this Division from damage, water, dust, or similar impairment, both in storage and installation until Notice of Completion has been filed. Materials, equipment or apparatus damaged because of improper storage or protection will be rejected and must be removed from the site.
 - 2. Cap openings in pipes and ends of valves with manufactured caps and fittings. Do not use taped caps.
 - 3. Protect premises and work of other Divisions from damage arising out of installation of work of this Division.

1.17 TESTING

- A. Provide tests specified hereinafter, where applicable. Provide written verification that the tests have been successfully completed.

1.18 COMPLETION

- A. Before Final Review: The work hereunder will not be reviewed for final acceptance until Operating and Maintenance Data, Manufacturer's Literature, Valve Directories, Piping Identification Code Directory and nameplates specified herein have been approved and properly posted in the building and final cleaning has been completed.
- B. Demonstration of Operations: When the installation is complete and adjustments specified herein have been made, operate the systems for one week, during which time demonstrate to the Architect that systems are completed and operating in conformance with these specifications.

1.19 GUARANTEE

- A. General: Conform to the GENERAL CONDITIONS of the specifications.
- B. Contractor shall guarantee the entire mechanical, plumbing and piping systems unconditionally for a period of two (2) years after final acceptance. If, during this period, any materials, equipment, or any part of the systems fail to function properly, the Contractor shall make good the defects promptly and without any expense to the Owner.

- C. Contractor shall be responsible for all damage to any part of the premises caused by leaks in pipelines or equipment furnished and installed under this Section for a period of two (2) years after date of acceptance of his work.
- D. Parts Warranty: Provide standard warranty of manufacturer for replacement of parts to apply after expiration of above period. Furnish replacement parts to Owner or to his service agency as directed. Furnish Owner printed manufacturer's warranties' complete with material included and expiration dates upon completion of project.
- E. Warranty also applies to services including instructions, adjusting, testing, noise, balancing, etc.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Beyond material and equipment specified, also provide incidental materials required to effect complete installation. Such incidental materials include solders, tapes, caulking, mastic, gaskets, and similar items.
- B. Materials and equipment shall be uniform throughout the installation. Equipment of the same type shall be of same manufacturer.
- C. Products from other manufacturers not listed shall submit specifically in accordance with Specification Section 01 25 13 – Product Options and Substitutions.

2.2 HANGERS AND SUPPORTS

- A. All required seismic bracing shall be installed as per Title 24, Part 2, 2016 CBC for total lateral forces prescribed in ASCE 7-10.
- B. Installation shall be as published by SMACNA or OSHPD anchorage pre-approved restraint system. All hanger material to be electroplated zinc or hot-dipped galvanized. No plain (black) finish allowed.
- C. Trapeze suspension (trapeze hangers may be used for parallel lines if pipes pitch same direction): Size channel assembly in accordance with manufacturer's published load ratings. No deflections shall exceed 1/360 of span (refer to Superstrut load tables).
- D. Support and laterally brace all ducts, pipes, and equipment per latest SMACNA Manual Standards.
- E. Do not support weight of piping from mechanical equipment, i.e., coil connections.
- F. Do not cut or weld to any structural steel without permission of Architect.
- G. Provide Semco, Trisolator, or equal pipe isolator at all hangers for non-insulated pipes.
- H. Schedule of hangers and supports:

INDIVIDUAL PIPE HANGERS		
Pipe Size - inches	Hanger	Minimum Rod Size - inches
1/2" thru 2"	Superstrut C711	3/8"
2-1/2" thru 3"	Superstrut C711	1/2"

INDIVIDUAL PIPE HANGERS		
Pipe Size - inches	Hanger	Minimum Rod Size - inches
4" and 5"	Superstrut C711	5/8"
6"	Superstrut C711	3/4"
8"	Superstrut C711	7/8"

TRAPEZE HANGERS	
Single or Double 12 Gauge Channel	Superstrut A1200 or A1202
Straps	Superstrut 70 or 702 series
Pipe Isolators	Superstrut 1-716 Cush-A-Clamp

WALL SUPPORT	
Individual pipe sizes up to 3"	Superstrut S250
Individual pipe sizes 4" thru 8"	Superstrut S251

2.3 ROOF, WALL AND FLOOR PENETRATIONS

- A. All pipe penetration through poured concrete wall or floor shall be sealed with Metra-seal as shown on drawings. All other pipe penetration holes shall be sealed with a product that will seal against the spread of flame, smoke, gases and water, for up to a 3 hour rating. Product shall be as manufactured by 3M Brand (Fire Barrier Penetration Sealing Systems) or equal. Product must have been tested and classified by Underwriters' Laboratories and listed in the UL Building Materials Directory; "Through-Penetration Fire stop Systems (XHEZ)," and "Fill, Void or Cavity Materials (XHHW)." Submittal shall reflect product and manufacturers Spec-Data sheet reflecting approvals.

- B. Provide pipe sleeves as follows:

SLEEVE LOCATION	SLEEVE MATERIAL
Floor membrane waterproof	Duco cast iron body with floor and roof construction flashing device, under deck clamp as required, J.R. Smith 1720 or approved equal. Non membrane floor and Standard weight black steel exterior wall pipe with a continuously welded water stop of 1/4" steel plate extending from outside of sleeve a minimum of 2" all around.
Non membrane floor and continuously exterior wall construction.	Standard weight black steel pipe with a welded water stop from outside of a sleeve, a minimum of 2" all around

- C. Length of sleeves as follows:

SLEEVE LOCATION	SLEEVE LENGTH
Floors	Equal to depth of floor construction including finish. Extend minimum 2" above floor level in unfinished area, and in pipe chases.

- D. Escutcheons: Provide 1" wide chrome or nickel plated plates on all pipes exposed to view, passing through floors, walls, partitions, etc. Escutcheons sized to fit pipe and pipe covering and give a finished appearance. Escutcheons held in place by set screws. Provide plates on pipes extending through sleeves.

2.4 ACCESS DOORS

- A. Furnished and installed under this Division.
- B. Install where shown or required by regulatory agencies and for access to all concealed valves, actuators, fire dampers, volume dampers, motors, equipment, etc.
- C. Access doors to be fire rated to match fire rating of wall or ceiling where door is to be installed.
- D. All doors shall have key operated lock.
- E. Door sizes shall be 24" x 24" minimum for ceilings and 12" x 12" minimum for walls.
- F. Non-rated door: 16 gauge frames, 14 gauge steel door, flange of door shall be 3/4" wide, hinge shall be concealed, continuous piano hinge, key operated cylinder lock, and finish shall be prime coat of rust inhibitive grey baked enamel.
- G. Karp Model DSC-214M drywall type with key operated cylinder lock and tile with exact fit. Finish shall be prime coat of rust inhibitive grey baked enamel.
- H. Karp Model KDW for gypsum drywall with key operated cylinder lock and tile with exact fit. Finish shall be prime coat of rust inhibitive grey baked enamel.
- I. Fire rated doors: UL rated for 1-1/2 hour, "B" level in walls and by Warnock Hersey for 3 hours in ceilings. 16 gauge frame, 20 gauge steel, welded pan type door, flange of door shall be 1" wide, 16 gauge steel, hinge shall be continuous, door shall be filled with 2" thick fire rated insulation, bolt type key operated latch, finish shall be prime coat of rust inhibitive grey baked enamel. Karp Model KRP-150FR.
- J. Coordinate all locations with Architect and other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

2.5 SEISMIC RESTRAINTS

- A. General Requirements: Seismic restraints shall be provided for all vibration isolated equipment, both supported and suspended, and all vibration isolated piping.
- B. Where anchorage details are not shown on the drawings, the field installation shall be subject to the approval of the mechanical engineer and the field engineer of the Division of the State Architect.
- C. All mechanical equipment shall be braced or anchorage to resist horizontal force acting in any direction per the Seismic note on Sheet M0.1:
- D. For Supported Equipment:
 - 1. Pre-approved isolator restraint system by the State of California and bear approval number.
 - 2. Submittal shall include load versus deflection curves up to 1/2" in the x, y, and z planes. Tests shall be conducted in an independent laboratory or under the signed

supervision of an independent registered engineer. The snubber assemblies shall be bolted to the test machine as the snubber is normally installed. Test reports shall certify that neither the bridge bearing neoprene elements nor the snubber body has sustained any obvious deformation after release from the load.

3. Submit calculations for each seismic restraint and vibration isolation signed by structural Registered Engineer.

E. Seismic Restraint Systems for Ductwork and Piping:

1. See Seismic notes on Sheet M0.1.
2. The bracing and attachments to the structure shall comply with one of the OSPD Pre-Approvals with OPA #, such as B-Line (OPA 0114), Mason Industries (OPA 349), ISAT (OPA 485) as modified to satisfy anchorage requirements of ACI 318 D.
3. Copies of the bracing system installation guide or manual shall be on the jobsite prior to starting hanging and bracing of the ductwork and pipe distribution systems

2.6 IDENTIFICATIONS

A. Piping:

1. Identify all piping with Brady Perma-Code, Stenton, or approved equal, self-sticking pipe markers consisting of pipe content wording and arrow indicating directions of flow on A.S.A. color background.
2. Arrow and wording are two separate markers which shall be placed immediately adjacent to each other.
3. Markers to be 50 feet apart (maximum) on centers and shall occur where a pipe enters and leaves a concealed space.
4. Use 2" high letter size for pipe or insulation 3" or larger, and 1" size for pipe or insulation 2-1/2" or smaller.
5. Provide at each end of each marker Brady or equal 2 1/4" wide self-sticking clear tape around the periphery of pipe or insulation to further secure the marker.
6. All markers shall be installed after finish painting is complete.

B. Piping Label Colors:

SERVICE	BACKGROUND COLOR	LETTER COLORS
Refrigerant Gas (Inherently Low Hazard)	Blue	White
Refrigerant Liquid (Inherently Low Hazard)	Green	White

- C. Equipment: Each piece of motor-driven equipment shall be identified by engraved plastic-laminate signs. Signs shall be a minimum of 4-1/2" x 1-1/2" with minimum of 1/2" high white letters on a black background, mounted permanently on equipment. The names shall correspond to those given on the control panels be identified as to the area or space served by the equipment. Automatically started motors shall have warning sign: "THIS MOTOR MAY START AT ANY TIME." The equipment shall be further identified with the electrical panel and circuit.

- D. Valves: All valves shall have 1-1/2" diameter brass disc stamped with 3/8" high letters showing type of services and valve number. Tags shall be attached to valves with brass chain.

- E. Refrigerant piping shall be identified in accordance with the UMC Standard 11-2. Identification shall include: type of refrigerant, function and pressure.

2.7 MOTORS AND DRIVES

- A. Type: NEMA Standard open drip-proof, totally enclosed air over (TEAO) or totally enclosed fan cooled (TEFC) type, as specified or indicated on drawings. Class B insulation 1.15 service factor on all motors. All motors shall be of high efficiency.
- B. Manufacturer: General Electric, Gould, Baldor or approved equal.
- C. All motors designed to operate at full load continuously without exceeding NEMA standards. Motors 40 HP and larger shall be part winding type.
- D. V-belt type sized for 150% of the motor horsepower. A minimum of two belts provided for drives where motors are rated one horsepower and larger.
- E. V-belt drive package of adjustable pitch type for motors up to 10 HP, fixed pitch for motors 15 HP and larger.

2.8 DRIVE GUARDS

- A. For machinery and equipment, provide guard as shown in AMCA 410 for belts, chains, couplings, pulleys, sheaves, shafts, gears and other moving parts regardless of height above the floor. Drive guards may be excluded where motors and drives are inside factory fabricated air handling unit casings.
- B. Materials: Sheet steel, cast iron, expanded metal or wire mesh rigidly secured so as to be removable without disassembling pipe, or duct, or electrical connections to equipment.
- C. Access for Speed Measurement: One inch diameter hole at each shaft center.

2.9 TOOLS AND LUBRICANTS

- A. Furnish and turn over to the owner special tools, 2 sets minimum, for each type or size of tool not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.
- B. Grease guns with attachments for applicable fittings: one for each type of grease required for each motor or other equipment.
- C. Tool containers: Hardwood or metal, permanently identified for intended service and mounted, or located where directed by the owner.
- D. Lubricants: A minimum of one quart of oil and one pound of grease, of equipment manufacturer's recommended grade and type in unopened containers and properly identified as to use for each different application.

PART 3 - EXECUTION

3.1 REVIEW OF CONSTRUCTION

- A. Work may be reviewed any time by representative of Architect.

- B. Advise Architect that work is ready for review at following times:
 - 1. Before concealment of work in walls and above ceilings.
 - 2. When requirements of Contract have been completed.
- C. Do not conceal work without Architect's consent.
- D. Maintain on project site a set of specifications and drawings for use by Architect's representative.

3.2 NOISE AND VIBRATION

- A. Correct conditions at no cost to the Owner if noise or vibrations because of improper material or installation occurs in the building.

3.3 GENERAL INSTALLATION METHODS

- A. Where pipe passes through seismic joint, install flexible connection as manufactured by Metraflex to allow vertical and horizontal movement during an earthquake.
- B. Carpentry, Cutting, Patching and Core Drilling:
 - 1. Provide carpentry, cutting, patching, and core drilling required for installation of material and equipment specified in this Division.
 - 2. Do not cut, core or drill structural members without consent of Architect.
 - 3. All asphalt and concrete sawing shall not have any outside corners cut.
- C. Waterproof Construction:
 - 1. Maintain waterproof integrity of penetration of materials intended to be waterproof. Caulk penetrations of foundation walls and floors watertight. Provide membrane clamps at penetrations of waterproof membranes.
 - 2. Provide weatherproof NEMA 3R enclosures for all equipment or devices mounted outside or otherwise exposed to the weather.
- D. Sleeves, Chases, and Concrete Inserts:
 - 1. Provide all required sleeves, chases, concrete inserts, anchor bolts, etc., and be responsible for correct location, installation of same.
 - 2. Sleeves and chases are prohibited in structural members, except where approved in writing.
 - 3. Locating and sizing of openings for ductwork through walls, etc., under this Division.
 - 4. Provide sleeves for each pipe passing through walls, partitions, floors and roofs.
 - 5. Set all pipe sleeves and inserts in place before concrete is poured. Coordinate the placing of these items to avoid delaying concrete placing operations.
 - 6. Locate all chases, shafts, and openings required for the installation of the mechanical work during framing of the structure. Do any additional cutting and boring required due to improperly located or omitted openings without cost of the Owner under the supervision of the Architect.
 - 7. Sleeves for un-insulated pipe shall be two pipe sizes larger than pipe passing through or a minimum of 1/2" clearance between inside of sleeve and outside of pipe.

8. Sleeves for insulated piping of adequate size to accommodate the full thickness of pipe covering with clearance for packing and caulking.
9. Caulk space between sleeve and pipe or pipe covering with an incombustible, permanently plastic, water-proof non-staining compound leaving a finished, smooth appearance or pack with incombustible fibrous glass to within 1/2" of both wall faces and provide plastic, water-proof caulking compound.
10. Finish and Plates: Smooth up rough edges around sleeve with plaster.

E. Mechanical Equipment:

1. Where not otherwise indicated, basis for equipment and material installation is published recommendations of respective manufacturer.
2. Equipment:
 - a. Accurately set and level with supports neatly placed and properly fastened. No allowance of any kind will be made for negligence on part of Contractor to foresee means of bringing in, installing equipment into position inside building.
 - b. All equipment shall be installed accessible on all sides with operable areas having a minimum space clearance as recommended by the manufacturer.
 - c. Where the School District determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, equipment shall be removed and reinstalled or remedial action performed as directed at no additional cost to the Owner.

F. Piping and/or Ductwork Systems:

1. Work into complete integrated arrangement, with like elements to make work neat appearing finish.
2. Run concealed, except as shown otherwise.
3. Exposed pipes and ductwork to run parallel with walls or structural element. Do not install any exposed pipe or ductwork without prior approval of Architect.
4. Install with adequate passageways free from obstructions, as high as practicable to maintain adequate head room, as shown or as required. Coordinate with work of other Divisions to achieve proper head room as specified in this Division.
5. Clearance: Do not obstruct spaces required by code in front of electrical equipment, access doors, etc.

3.4 TESTING AND ADJUSTING

- A. General: All defects disclosed as result of the following or other tests or operations shall be promptly repaired by and at expense of Contractor and to Architect's satisfaction. Test shall comply with all necessary codes, rules, and regulations as noted herein before. Contractor shall supply all instruments, labor and tools required by tests. Any defective material and/or equipment shall be repaired, adjusted and replace by new, like materials and equipment, and retested before acceptance.
- B. Clean and purge equipment and piping before each test.
- C. Test various mechanical systems in portions as work progresses. Any system or portion previously tested to become part of any repeated test when it becomes part of distribution or collection system.
- D. Maintain test pressures for periods stated, or as directed, without loss in pressure except that due to change in temperature or authorities having jurisdiction.

- E. Operational Tests: Operational tests shall be made on all machinery and devices to determine proper compliance with specifications. All equipment shall function quietly and efficiently; any undue noise or vibration caused by malfunctioning of piping and equipment shall be promptly repaired and/or corrected before acceptance.
- F. Timing of Tests: Two weeks before expected completion date, the Contractor shall put all systems and equipment into operation and shall continue operation of same during each working day, but not less than five 8-hour periods, until all adjusting, balancing, testing, demonstrations, instructions and cleaning of systems have been completed. Instructions and demonstrations required shall be given simultaneously with this operation.
- G. Duct Leakage Tests: All ductwork with 2" W.C. or higher static pressure shall be tested for leaks, using necessary instruments. Conduct tests as recommended in SMACNA balancing manual. Ductwork handling air pressure less than 2" W.C static pressure shall be sealed wherever visible or tactile observations reveal leakage.
- H. After completion of testing and adjustment, operate the different systems and equipment under normal working conditions for two days and show specified performance. If, in the opinion of the Architect, performance of equipment or systems is not according to specifications or submitted data, alter or replace equipment at no increase in contract sum. Contractor, at his option, may order tests from an independent approved laboratory to prove compliance. All such tests shall be at no increase in contract sum.
- I. At completion of work, perform and submit the Mechanical Acceptance forms (MECH-2 through MECH-5A as applicable) in accordance with Title 24, Part 6.

3.5 INSTALLATION OF PIPING AND EQUIPMENT

- A. Closing-In of un-inspected Work: Do not allow or cause any of the work to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Any work enclosed or covered prior to such inspection and test shall be uncovered and, after it has been inspected, tested, and approved, make all repairs with such materials as may be necessary to restore all work, including that of other trades, to its original and proper condition.
- B. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact locations and depth of existing utility and service lines to which he is going to connect. In event depth of existing sewer main or storm drain is not sufficient to permit installation of piping as detailed on drawings or to make connection in manner indicated; Contractor shall confer with the Architect, Owner's representative and Engineer for Direction.
- C. Conceal all piping within finished rooms, unless otherwise noted on drawings.
- D. Cut pipe accurately to measurements established at the building; 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.
- E. Make all changes in direction with fittings and changes in main sizes through eccentric reducing fittings. Unless otherwise noted, install water supply and return piping with straight side of eccentric fittings at top of pipe.
- F. Provide sufficient swing joints, ball joints, expansion loops, and devices necessary for a flexible piping system.
- G. Provide union and isolating valves on piping at all equipment or apparatus. Locate valves so that the equipment can be removed without dismantling any branch lines.

- H. Install drain valves at all low points of each system to enable complete drainage, and air vents at all high points in the piping system to enable complete air venting. Install automatic air vent at all high points in the main piping systems.
- I. Support piping independently at pumps, coils, tanks, and the like so that its weight will not be supported by the equipment.
- J. Pipe all drains from pump glands, drip pans, relief valves, air vents, etc., to spill over an open sight drain, floor drain or other acceptable discharge points, and terminate with a plain end unthreaded pipe, 2" above the drain.
- K. Securely bolt in place to building structures, all equipment, isolators, hangers, etc.
- L. Pitch pipe line as required for proper drainage and elimination of air.
- M. Wire for hanging or strapping pipes not permitted.
- N. Support each run of piping independently from all other piping.
- O. Install spring vibration isolation in mechanical rooms and penthouse for all pipes' elbows and also within 40 feet of pipe length.
- P. Equipment Access:
 - 1. Install all piping, equipment and accessories to permit access for maintenance. Relocate piping, equipment and accessories required to provide maintenance access at no additional cost.
 - 2. Furnish access doors where any valves and equipment requiring access for servicing, repairs or maintenance located in walls, chases or above ceilings. Coordinate the location of access doors of access doors with and install by the applicable Contractor installing walls or ceilings.
- Q. Install gauges, thermometers, valves and other devices with due regard for ease in reading or operating and maintaining said devices. Locate and position thermometers and gauges to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.

3.6 PIPE JOINTS

- A. Welded Piping:
 - 1. Make welds in a thoroughly first class, workmanlike manner by welders experienced in piping work. Welders used in the work certified as having qualified within the preceding 6 months in accordance with AWS standard qualification procedures.
 - 2. Grind out all welds with cracks, blow holes, porosities or other defects and replace at no additional cost to the Owner. On lightweight piping, extreme care must be taken to prevent burning holes through the piping material. Piping with any such holes must be removed and replaced.
- B. Screwed Piping:
 - 1. Cut with machine cutter, hand pipe cutter or Carborundum pipe wheel. Deburr with file or scraper or pipe reamer. Do not ream to exceed I.D. or pipe and thread to ANSI B2.1 requirements.
 - 2. Use Teflon tape on male thread prior to joining other services. No more than 2 full threads shall remain exposed after joining.

C. Copper Tubing:

1. Cut square, remove burrs and clean pipe and inside of female fitting to a bright finish with steel wool, wire brush, sandpaper or emery cloths. Apply solder flux with brush to tubing. Remove internal parts of solder-end valves prior to soldering.
2. Provide dielectric unions at points of connection of all copper tubing and any ferrous piping and equipment.
3. Joining of Copper Pipes:
 - a. Piping 1-1/2" and smaller: 95-5 solder
 - b. Piping larger than 1-1/2": Sil-Fos brazing 1000°F minimum.
 - c. All solder shall be lead free.

3.7 HANGERS AND SUPPORTS:

A. Piping:

1. Space hangers and supports for horizontal copper tubing according to the following schedule:

TUBE SIZE - inches	MAXIMUM SPACING
1" and smaller	6 feet on center
1-1/4" and 1-1/2"	7 feet on center
2" and 2-1/2"	8 feet on center
3" and larger	10 feet on center

2. Space hangers and supports for horizontal iron pipes according to the following schedule:

PIPE SIZE - inches	MAXIMUM SPACING
1-1/4" and smaller	8 feet on center
1-1/2" thru 3"	10 feet on center
4" and larger	14 feet on center
All cast iron	5 feet on center*

- a. * Locate hangers within 18" of each joint per California Building Code.

3. Safety Hanger Wires:

- a. For air diffusers and other mechanical units to be mounted on suspended-grid ceiling systems and weighing less than 20 pounds may be supported directly on the runners of a heavy duty grid system but, in addition, they must have a minimum of two (2) #12 gage slack safety wires attached to the fixture at diagonal corners and anchored to the structure above.
- b. In advance of ceiling hanger-wire work, provide to job site layouts and/or instruction necessary for proper installation of safety wires.
- c. Connect safety wires to mechanical diffusers and equipment.
- d. For diffusers and equipment units weighing 20 pounds or more must be independently supported by not less than four (4) taut #12 gage wires, each attached to the fixture and to the structure above. The four (4) taut #12 gage wires, including their attachment to the structure above, must be capable of supporting four (4) times the weight of the unit.

3.8 IDENTIFICATION OF VALVES

- A. Provide 3 typewritten charts assembled in 3-ring binders showing the valve numbers together with their locations and use. Mount on metal frames and installed as directed the Architect.

3.9 VIBRATION ISOLATION

- A. The entire system, including equipment, air ducts, pipes, motors, and all other parts must be noiseless and free of vibration transmission.
- B. The Contractor shall not install any equipment or pipe which makes rigid contact with the "building" unless it is approved in this specification or by the Architect. "Building" includes slabs, beams, studs, walls, lath, etc.
- C. The installation or use of vibration isolators must not cause any change of position of equipment or piping which would result in stresses in piping connections or misalignment of shafts or bearings. In order to meet this objective, equipment and piping shall be maintained in a rigid position during installation. The load shall not be transferred to the isolator until the installation is complete and under full operational load.
- D. The Contractor shall correct, at no additional cost, all installations which are deemed defective in workmanship or materials by the Architect.

3.10 PROTECTION, CARE, AND CLEANING

- A. Provide adequate means for, and fully protect, all finished parts of the materials and equipment against physical damage from whatever cause during the progress of this work and until final completion.
- B. During construction, properly cap all lines and equipment nozzles so as to prevent the entrance of sand, dirt, etc. Protect equipment against moisture, plaster, cement, paint or other work of other trades by covering it with polyethylene sheets.
- C. After installation has been completed, clean all systems.
- D. Piping, Ductwork and Equipment to be insulated: Clean exterior thoroughly to remove rust, plaster, cement, and dirt before insulation is applied.
- E. Piping, Ductwork and Equipment to be painted: Clean exterior of piping, ductwork and equipment, exposed in completed structure, removing rust, plaster cement, and dirt by wire brushing. Remove grease, oil, and similar materials by wiping with clean rags and suitable solvents. Touch up primer coat as required.
- F. Motors, Pumps and Other Items with Factory Finish: Remove grease and oil and leave surfaces clean and polished.

3.11 LUBRICATION

- A. Upon completion of the work and before turning over to the Owner, clean and lubricate all bearings except sealed and permanently lubricated bearings. Use only lubricant recommended by the manufacturer.

3.12 PAINTING

- A. Properly prepare work under this Division to be finish painted under SECTION 09 91 00, "PAINTING".
- B. Paint duct black behind grilles and diffusers where duct is visible.

- C. Paint exterior wall cap, and louver to match wall color or coordinate with architect before installation.

3.13 COMPLETION

- A. Before Final Review: The work hereunder will not be reviewed for final acceptance until Operating and Maintenance Data, Manufacturer's Literature, Valve Directories, Piping Identification Code Directory and name plates specified herein have been approved and properly posted in the building and final cleaning has been completed.
- B. Demonstration of Operations: When the installation is complete and adjustments specified herein have been made, operate the systems for a period of one week, during which time demonstrate to the Architect that systems are completed and operating in conformance with these specifications.

END OF SECTION

06/08/18

SECTION 23 05 93

TESTING, ADJUSTING AND BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The General Conditions, Special Conditions, Division 1 - General Requirements, and Section 23 05 00 are hereby made a part of this Section as if repeated herein.

1.2 SECTION INCLUDES

- A. Air systems.

PART 2 - PRODUCTS - not used

PART 3 - EXECUTION

3.1 QUALIFICATION

- A. Balancing to be performed by independent balancing specialty firm.
- B. Certified member of Associated Air Balancing Council (AABC), in accordance with AABC guide and recommendations or
- C. Certified member of National Environmental Balance Bureau (NEBB), in accordance with NBBC performance and techniques and
- D. Follow recommended procedures by ASHRAE and SMACNA.
- E. Shall be under the direct supervision of the general contractor. Shall adjust and re-adjust this part of the work until the operation complies with the requirements of the drawings and specifications.

3.2 COORDINATION

- A. Coordinate required locations of duct test openings during construction period.
- B. Provide all necessary action and coordination with regard to ACCEPTANCE TESTING as outlined in Specification Section 23 05 00.

3.3 PROCEDURES - PRECONSTRUCTION PLAN CHECK & REVIEW

- A. Use instruments accurately calibrated and maintained in good working order. If requested, conduct tests in the presence of a representative of the Architect and/or a representative of the Owner.
- B. General: Submit to the Architect the following in accordance with conditions of the Contract and Division 1 specification sections.

1. Review the project documents and contractor submittals for their effect on the test and balance process and overall performance of the HVAC system.
2. Review location and type of volume dampers in the air distribution system.
3. Review inlet conditions to HVAC equipment.
4. Review locations, type and size of balancing valves, and automatic control valves in the water flow system.
5. Review location of pressure sensors in the air and water distribution systems.
6. Review automatic control systems as they affect the test and balance procedure and the final Acceptance Testing.

3.4 PROCEDURES - ONGOING JOB SITE INSPECTIONS

- A. During construction, the balancing agency shall inspect the installation of pipe systems, sheet metal work, temperature controls, and other component parts of the HVAC systems. Inspections shall be conducted a minimum of two times. (Typically this is performed when 60% of the duct work is installed and again when 90% of the total system is installed and prior to insulation of the piping.)
- B. The balancing agency shall submit a written report (3 copies) of each inspection to the Owner's representative, the consultant and the contractors responsible for correcting noted deficiencies.
- C. Check for necessary balancing hardware (dampers, flow meters, valves, pressure taps, thermometer well, etc.) to determine if they are installed properly and readily accessible.
- D. Identify and evaluate any variations from system design.
- E. Identify and report possible restriction in systems (closed fire dampers, poorly designed duct fittings, etc.).
- F. Notify HVAC contractor of air or water system performance deficiencies by the test before balancing the system.
- G. Beginning of work means of acceptance existing conditions.

3.5 AIR SYSTEM TEST & BALANCE PROCEDURES

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities.
- B. Make air quantity measurements in ducts by traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers.
- E. Vary total system air quantities first by adjustment of fan speeds. Provide drive changes as required. Vary branch air quantities by damper regulation as secondary adjustment.

F. Balancing and adjusting air systems:

1. Perform the following tests, compile information and submit on report form with suitable cover, index, etc.
2. Air balance shall be performed with filters partially blocked to simulate a 90 percent loading of filters.
3. Fan Speeds: Test and adjust fan RPM to achieve design CFM requirements. Make any changes in pulley sheave, belts, and dampers or add dampers necessary to correct balance at no additional cost to owner.
4. Current & Voltage: Measure and record motor current and voltage.
5. Pitot Tube Traverse: Perform a Pitot tube traverse of main supply and return ducts to obtain total CFM. If a Pitot tube traverse is not practical, the summation of the outlets or inlets may be used. An explanation of why a traverse was not made must appear on the appropriate data sheet.
6. Outside Air: Test and adjust system minimum outside air by Pitot tube traverse. If a Pitot tube traverse is not practical, the percentage of outside air may be determined by calculations from the return air, outside air, and mixed air temperature. Make allowances for heat of compression and motor heat where applicable.
7. Static Pressure: Test and record system static pressures, including suction and discharge static pressure profile of each fan.
8. Air Temperature: Take wet bulb and dry bulb air temperatures on the entering and leaving side of each cooling coil. Dry bulb temperatures shall be taken on the entering and leaving side of each heating coil and gas heater.
9. Zone Ducts (Supply & Return): Adjust zone ducts to within design CFM requirements.
10. Main Ducts: Adjust main ducts to within design CFM requirements. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.
11. Branch Ducts: Adjust branch ducts to within design CFM requirements.
12. Tolerance: Test and balance each diffuser, grille, and register to within plus or minus 5 percent of design requirement.
13. Identification: Identify the location and area of each grille, diffuser, register, and terminal box. This information shall be recorded on air outlet data sheets.
14. Description: Record the size and type of each diffuser, grille, and register on air outlet data sheets.
15. Minimizing Drafts: Adjust all diffusers, grilles, and registers to minimize drafts in all areas.
16. Exhaust, Supply and Transfer Fans.
 - a. Measure fan static pressures, total CFM, makeup air and fan RPM.
 - b. Measure motor operating voltage and amperage.
17. Record the specified, against the actual, supplied horsepower and electrical characteristics of all motors.
18. Verify capacities of all A.C. systems, make-up air units, and supply transfer and exhaust fans.

3.6 CONTROL SYSTEMS VERIFICATION

- A. Verify that all control devices are properly connected.
- B. Verify that all dampers, and other controlled devices are operated by the intended controller.
- C. Verify that all dampers are in the position indicated by the controller (open, closed or modulating).
- D. Verify the integrity of dampers in terms of tightness of close-off and full-open positions.
- E. Check the location of all thermostats for potential erratic operation from outside influences such as sunlight, drafts or cold walls.
- F. Check the sequence of operation that any control mode is in accordance with approved shop drawings.
- G. Verify that all controller set points meet the design intent.
- H. Check all dampers for free travel.
- I. Verify the operation of all interlock systems.
- J. Perform all system verification to assure the safety of the system and its components.

3.7 SYSTEM PERFORMANCE VERIFICATION

- A. At the time of final inspection, the Test and Balance (TAB) Agency shall recheck, in the presence of the Owner's Representative, specific and random selection of data, air quantities, and air motion recorded in the Certified Report.
- B. Points and areas for recheck shall be selected by the Owner's Representative.
- C. Measurement and test procedures shall be the same as approved for work forming a basis of Certified Report.
- D. Selections for recheck, specific plus random, will not normally exceed 25 percent of the total number tabulated in the report, except that special air systems may require a complete recheck for safety reasons.
- E. If random tests elicit a measured flow deviation of ten percent or more from that recorded in the Certified Report listings, by ten percent or more of the selected recheck stations, the report is rejected, all systems shall be readjusted and tested, new data recorded, new Certified Report submitted, and new inspections tests made, all at no additional cost to Owner.
- F. Following system verification of the Certified Report by the Owner's Representative, the settings of all valves, splitters, dampers, and other adjustment devices shall be permanently marked by the TAB Agency, so that adjustment can be restored if disturbed at any time. Devices shall not be marked until after system verification.

3.8 RECORDS

- A. Keep continuous record of all test reading and submit three (3) copies of typewritten balancing reports upon completion. Submit floor plan indicating location of all measurements including terminal units, air outlets, and fans.
- B. Upon completion of the work, submit all records and certifications approving the testing requirements to the Architect before final payment is made.
- C. Defective work or material replaced or repaired, as necessary and the inspection and test repeated. Repairs made with new materials. No caulking of screwed joints or holes will be acceptable.
- D. No part of any work shall be covered until after it is inspected, tested and approved.

END OF SECTION

06/08/18

SECTION 23 07 00

MECHANICAL INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Field applied insulation for thermal efficiency and condensation control for HVAC, piping systems (HVAC), ductwork and equipment.
- B. Definitions:
 - 1. Air-conditioned space: Space directly supplied with heated or cooled air.
 - 2. ASJ: All service jacket, white finish facing or jacket.
 - 3. Cold: Equipment, ductwork or piping handling media at design temperature of 60°F or below.
 - 4. Concealed: Ductwork and piping above ceilings and in chases, interstitial space, and pipe spaces.
 - 5. Conditioned Space: A room area which is heated or cooled.
 - 6. Exhaust Duct: A duct transporting air from one or more rooms only to the out-of-doors.
 - 7. Exposed: Piping, ductwork, and equipment exposed to view in finished areas including mechanical and electrical equipment rooms. Attics and crawl spaces where air handling units are located are considered to be mechanical rooms. Shafts, chases, interstitial spaces, unfinished attics, crawl spaces and pipe basements are not considered finished areas.
 - 8. FSK: Foil-scrim-kraft facing.
 - 9. Hot: Ductwork handling air at design temperature above 60°F; equipment or piping handling media above 105°F.
 - 10. Return Duct: A duct transporting air from one or more rooms toward fan if such air can be, at any time, circulated back to any rooms.
 - 11. Run-outs: 2" maximum pipe size and 12 feet maximum branch length connection to individual equipment.
 - 12. Thermal conductance: Heat flow rate through materials.
 - a. Flat surface: BTU per hour per square foot.
 - b. Pipe or cylinder: BTU per hour per linear foot.
 - 13. Thermal conductivity ('k'): BTU per inch thickness, per hour, per square foot, per degree Fahrenheit temperature difference.
 - 14. Transfer duct: A duct transporting air from one or more rooms to another room or rooms.
 - 15. Unconditioned Space: A room or area which is neither heated nor cooled.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 23 05 00, GENERAL MECHANICAL PROVISIONS.
- B. Section 23 23 00, REFRIGERANT PIPING
- C. Section 23 31 00, DUCTWORK AND ACCESSORIES
- D. Section 23 74 33, PACKAGED AIR CONDITIONING UNIT.

1.3 REFERENCES

- A. ASTM C518 - Steady State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- B. ASTM C553 - Mineral Fiber Blanket and Felt Insulation.
- C. ASTM C612 - Mineral Fiber Block and Board Thermal Insulation.
- D. ASTM E84 - Surface Burning Characteristics of Building Materials.
- E. ASTM E96 - Water Vapor Transmission of Materials.
- F. CMC – California Mechanical Code.
- G. NFPA 90A - Installation of Warm Air Heating and Air Conditioning Systems.
- H. NFPA 255/UL 723 - Surface Burning Characteristics of Building Materials.
- I. USGBC – U.S. Green Building Council.

1.4 CRITERIA

- A. Comply with NFPA 90A, particularly paragraphs 2-1.3; 2-2; and 3-3.8, parts of which are quoted as follows:
 - 1. "2-1.3.1 Duct coverings, duct linings, vapor barrier facings, tapes, and core materials in panels used in duct system shall have a flame spread rating not over 25 without evidence of continued progressive combustion and a smoke developed rating not higher than 50. If coverings and linings are to be applied with adhesives, they shall be tested as applied with such adhesives, or the adhesives used shall have a flame spread rating not over 25 and a smoke developed rating no higher than 50 when in the final dry state."
 - 2. "2-1.3.6 Pipe insulation and coverings shall meet the requirements of 2-2.1.2(a) when installed in ducts, plenums, or concealed spaces used as part of the air distribution system."
 - 3. "2-2.1.2(a) All materials exposed to the air flow shall have smoke developed ratings not greater than 50 and be non-combustible or limited combustible."
 - 4. "3-3.8.1 Where ducts pass through walls, floors, or partitions required to have a fire resistance rating and fire dampers are not required, the opening in the construction around the duct shall not exceed one inch (2.54 cm) average clearance on all sides and shall be filled solidly with an approved material capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste when subjected to the same NFPA 255 time-temperature fire conditions required for fire barrier penetration." (Note: By NFPA 101, 6-2.3.4 and 6-3.6, this requirement applies to pipe penetrations of fire or smoke barriers also.)
- B. Test methods: ASTM E84, UL 723, or NFPA 255.
- C. Specified 'k' factors are at 75°F mean temperature unless stated otherwise. Where optional thermal insulation material is used, select thickness to provide thermal conductance no greater than that for the specified material. For pipe, use insulation manufacturer's published heat flow tables. For domestic hot water supply and return, run out insulation and condensation control insulation, no thickness adjustment need be made.
- D. All materials shall be compatible and suitable for service temperature, and shall not contribute to corrosion or otherwise attack surface to which applied in either the wet or dry state.

- E. Underwriters Laboratories, Inc., label or listing, or satisfactory certified test report from an approved testing laboratory will be required to show that surface burning characteristics for materials to be used do not exceed specified ratings.
- F. Lining materials installed within ducts shall have mold, humidity and erosion resistant surface that meet the requirements of CMC 605.0, ASTM C 1104 and ASTM C 1071 for surface erosion resistance.
- G. General: All insulating material required for piping, mechanical equipment and duct work etc., shall be furnished and installed under this Section of the specifications. The execution of the work shall be in strict accordance with Title 24, Energy Conservation Standards and the best practice of the trade and the intent of this specification. All insulation shall be UL listed and shall meet all code requirements.
- H. Surface burning characteristics:
 - 1. Flame spread.....25
 - 2. Smoke developed.....50
- I. Every package or standard container of insulation or accessories delivered to the job site for use must have a manufacturer's stamp or label giving the name of the manufacturer and description of the material.
- J. Acceptable Manufacturers:
 - 1. Fiberglass Insulation: Owens-Corning Fiberglas, CertainTeed, Knauf.
 - 2. Flexible Elastomeric: Armstrong, Halstead, IMOCA, or Rubatex.
 - 3. Fiberglass Premolded Pipe Fitting Covers: Insul-Coustic/Birma Corp., Childers, Speedline, or Zeston.
 - 4. Adhesives and Cements: Armaflex Low VOC Spray Contact Adhesive by Armacell.
 - 5. Weld Pins: Nelson Stud Welding Div. TRW Inc. Duro Dyne Corp., Tuff-Weld, or Grip Nail.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.
- C. Manufacturer's products for insulation, adhesives and caulk shall be listed by the USGBC.

1.6 SUBMITTALS

- A. Manufacturer's Literature and Data:
 - 1. Insulation materials: Each type used. State surface burning characteristics.
 - 2. Insulation listings for all required Standards Listing.
 - 3. Insulation facings and jackets: Each type used. Make it clear that white finish will be furnished for exposed ductwork, casings and equipment.
 - 4. Insulation accessory materials: Each type used.
 - 5. Manufacturer's installation and fitting fabrication instructions for flexible unicellular insulation.
 - 6. Make reference to applicable specification paragraph numbers for coordination.

PART 2 - PRODUCTS

2.1 PIPE INSULATION

- A. Elastomeric Foam: ASTM C534; closed cell, Microban antimicrobial, fiber free flexible elastomeric foam in tubular form.
 - 1. 'K' ('ksi') Value: 0.25 at 75°F mean temperature.
 - 2. Application: Refrigerant liquid and suction lines, and any other piping below 40°F.
 - 3. Built-in vapor retardant barrier.
 - 4. UV-resistance white color insulation.
 - 5. Connection: reinforced lap seal.
- B. Inserts:
 - 1. Insulation inserts at pipe supports: Provide for all insulated piping. Install with metal insulation shields furnished with pipe supports, Section 15010 General Mechanical Provisions.
 - 2. Material: Premolded, high density mineral fiber blocks, minimum density 20 lb/ft³, of same thickness as adjacent insulation.
 - 3. Up through 5 inch pipe use 6 inch long insert Blocks.
 - 4. Optional insert material: 180 degree segment of calcium silicate, or 9 lb/ft³ minimum density of cellular glass or mineral fiber.

2.2 JACKETS

- A. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 - 1. Products: Subject to compliance with requirements, provide one of the following
 - a. Johns Manville; Zeston.
 - b. P.I.C. Plastics, Inc.; FG Series.
 - c. Proto Corporation; LoSmoke.
 - d. Speedline Corporation; SmokeSafe.
 - e. Line-Hide by Mitsubishi.
 - 2. Adhesive: As recommended by jacket material manufacturer.
 - 3. Color: White or Off-white.
 - 4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.3 DUCTWORK & PLENUM INSULATION

- A. Flexible Glass Fiber: ASTM C653; flexible, non-combustible blanket.
 - 1. 'K' ('ksi') Value: ASTM C518, 0.48 at 75°F.
 - 2. Density: 0.75 lb/ft³.
 - 3. Maximum service temperature: 250°F.
 - 4. Thickness: 1½" unless otherwise specified.
 - 5. Vapor Barrier Jacket: Kraft paper reinforced with glass fiber yarn and bonded to aluminized film vinyl, secured with pressure sensitive tape. Moisture vapor transmission: ASTM E96; 0.5 perm.
 - 6. Tie Wire: Annealed steel, 16 gauge.
- B. Duct Liner: ASTM C553; flexible, non-combustible blanket.
 - 1. 'K' ('ksi') Value: ASTM C518, 0.24 at 75°F.
 - 2. Density: 1.5 lb/ft³ minimum.
 - 3. Maximum service temperature: 250°F.
 - 4. Thickness: 1" standard, 2" where indicated on plans.

5. Maximum Velocity on Coated Air Side: 4,000 ft/min.
6. Adhesive: Waterproof, fire retardant type.
7. Liner Fasteners: Galvanized steel anchor pins with speed washers.
8. Adhesives and Sealants: UL listed or classified. Type 1 per Adhesive and Sealant Council Standard ASCC-A-7001 and listed by the USGBC.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

- A. Required pressure tests and connections shall be completed and the work approved by the Owner or Owner's representative before application of insulation. Surface shall be clean and dry with all foreign materials, such as dirt, oil, loose scale and rust removed.
- B. Apply covering (jackets) after pipes, ducts and equipment have been tested and proven tight.
- C. Except for specific exceptions, insulate entire specified equipment, piping, (pipe, fittings, valves, accessories) and duct systems. Insulate each pipe and duct individually. Do not use scrap pieces of insulation where a full length section will fit.
- D. Insulation materials shall be installed in a first class manner with smooth and even surfaces, with jackets and facings drawn tight and smoothly cemented down at all laps. Insulation shall be continuous through all sleeves and openings, except at fire dampers and duct heaters (NFPA 90A). Vapor barriers shall be continuous and uninterrupted throughout systems with operating temperature 60°F and below. Lap and seal vapor barrier over ends and exposed edges of insulation. Anchors, supports and other metal projections through insulation on cold surfaces shall be insulated and vapor sealed for a minimum length of six inches.
- E. Insulation on piping shall be terminated square at items not to be insulated, access openings and nameplates. Cover all exposed raw insulation with white sealer or jacket material.
- F. HVAC work not to be insulated:
 1. Internally insulated ductwork and exhaust air except where otherwise designated.
 2. In hot piping: Unions and flexible connectors. Insulate piping to within approximately three inches of un-insulated items.
 3. Do not internally line exhaust ducts serving kitchen or dishwasher hoods or vapor laden ducts.
- G. Apply insulation materials subject to the manufacturer's recommended temperature limits.

3.2 INSTALLATION

- A. Installation: In absence of specified installation requirements follow manufacturer's published recommendations.
- B. Continue insulation vapor barrier through penetrations.
- C. Piping Insulation:
 1. Locate insulation and cover seams in least visible locations.
 2. Neatly finish insulation at supports, protrusions, and interruptions.
 3. Provide insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature with vapor barrier jackets. Finish with glass cloth and vapor barrier adhesive. Insulate complete system.

4. For insulated pipes conveying fluids above ambient temperature, provide standard jackets. Bevel and seal ends of insulation at equipment, flanges, and unions.
5. Provide insert between support shield and piping on piping 2 inches diameter or larger.
6. For pipe exposed to weather, in mechanical equipment rooms or in finished spaces below 10 feet above finished floor, finish with PVC jacket and fitting covers.
7. Butt edges neatly.
8. Fill voids with insulating cement.
9. Continue insulation passing through sleeves or other openings.
10. Insulate fittings with pre-molded fiberglass fitting covers or molded Fiberglas or Owens corning No. 10 insulating cement or equal thickness to that of adjoining insulation and finished with a one-piece fireproof polyvinyl chloride fitting cover.
11. Valves, fittings, flanges and accessory insulation:
 - a. Valves, including bonnets.
 - b. Flanges
 - c. Fittings
 - d. Strainers
 - e. Expansion joints
 - f. Specialties

D. Flexible Elastomeric Cellular Thermal insulation:

1. Apply insulation and fabricate fittings in accordance with manufacturer's installation instructions.
2. Pipe and tubing insulation:
 - a. Use proper size material. Do not stretch or strain insulation.
 - b. To avoid undue compression of insulation, provide cork stoppers or wood inserts at supports as recommended by the insulation manufacturer.
 - c. Where possible, slip insulation over the pipe or tubing prior to connection, and seal the butt joints with adhesive. Where the slip-on techniques are not possible slit the insulation and apply it to the pipe sealing the seam and joints with contact adhesive. Optional tape sealing as recommended by the manufacturer, may be employed. Make changes from mineral fiber insulation in a straight run of pipe, not at a fitting. Seal joint with tape.
3. Other applications: Apply sheet insulation to flat or large curved surfaces with 100% adhesive coverage. Adhere the seams only for fittings and large pipe.
4. Outdoor installation: Provide PVC jacketing.

E. External Ductwork Insulation:

1. Secure with 4" strips of adhesive, 8" on center.
2. For rectangular ducts 24" and wider, secure to bottom of duct with mechanical fasteners 18" on center.
3. Wrap with 18 gauge galvanized wire, 18" on center.
4. Adhesive requirements same as for duct liner.
5. Provide insulated ductwork conveying air below ambient temperature with vapor barrier jacket. Finish with tape. Seal vapor barrier penetrations with vapor barrier adhesive.
6. Provide insulated ductwork conveying air above ambient temperature with or without standard vapor barrier jacket. Where service access is required, bevel and seal ends of insulation.
7. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
8. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging.
9. For ductwork exposed in mechanical equipment rooms or in finished spaces, finish with aluminum jacket.
10. For exterior ductwork with external insulation provide aluminum jacket sealed watertight with caulk.

F. Duct Liner:

1. Secure liner with adhesive for 100% coverage, anchor pins and speed washers. Refer to SMACNA Duct Liner Application Standards for installation.
2. Seal liner surface penetrations with adhesive.
3. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for liner thickness.
4. Surface adjacent to air flow, including at joints, shall be uniformly flat.
5. Seal butt joint edges of liner to prevent erosion. For rectangular ducts provide sheet metal end caps to cover liner edges at entering and leaving edges of lined duct section; for round ducts use low velocity duct sealant. For plenum lining, provide sheet metal caps at exposed edges, e.g., where liner terminates at access door.

3.3 PIPING INSULATION SCHEDULE

Code	System Fluid Temp (°F)	Nominal Pipe diameter (in inches)					
		Run-outs	1" & Less	1-1/4 - 2"	2-1/2 - 4"	5-6"	8" & Larger
		Minimum insulation thickness, inches					
II	40 - 60	1/2	1/2	1/2	1	1	1

- A. System Codes and Insulation Types: Provide elastomeric insulation on refrigerant pipes.
1. Code II: Refrigerant suction and liquid piping.
- B. Notes for Piping Insulation Schedule
1. Where systems are scheduled, insulate supply and return piping.
 2. Fluid temperature means specified supply temperature.

3.4 DUCTWORK INSULATION SCHEDULE

SERVICE	SUPPLY	RETURN	EXHAUST
In Mechanical and Fan Rooms	DL	DL	DL
Within 10' or 10 duct diameters of fan, whichever is greater	DL	DL	DL
Concealed between roof and ceiling	WV	W	--
Out of doors unless otherwise noted	DL	DL	--
Concealed in shaft adjacent To unconditioned space or building exterior	WV	W	--
Other concealed	WV	--	--
Exposed within space	--	--	--
Return and exhaust stub ducts from ceiling plenum into shafts	--	--	--

- A. Notes for Duct Insulation Schedule
1. Abbreviations:
 - a. DL Duct Liner
 - b. W Flexible Glass Fiber Duct wrap without vapor barrier
 - c. WV Flexible Glass Fiber Duct wrap with vapor barrier
 2. Where lining is specified, other insulation is not required.
 3. Where lining is specified in ducts or shafts constructed of architectural materials, apply plenum lining to such materials.
 4. Where round ducts are specified to be lined, use one of the following methods:
 - a. Line ducts as specified.
 - b. Provide pre-insulated duct or approved equal.
 - c. Where space permits and where permitted by Architect, provide equivalent size lined rectangular ducts (based on equal friction) in lieu of lined round ducts.

3.5 HANGER AND SUPPORT INSTALLATION

- A. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- B. Insulated Piping:
 - 1. Specify parts in first three subparagraphs below as galvanized or painted, as required. Other materials are available in place of wooden blocks.
 - 2. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 - 3. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 - 4. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 - 5. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
 - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
 - 6. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
 - 7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

END OF SECTION

06/08/18

SECTION 23 09 00

HVAC INSTRUMENTATION AND CONTROLS

PART 1 - GENERAL

1.1 GENERAL

- A. Furnish an Alerton Envision for BACtalk EMS system to meet District EMS standards. System shall be a native-BACnet system and shall be based on a distributed control system in accordance with this specification. The operator's workstation, all building controllers, application controllers, and all input/output devices shall communicate using the protocols and network standards as defined by ANSI/ASHRAE Standard 135-2001, BACnet. In other words, all workstations and controllers, including unitary controllers, shall be native BACnet devices. No gateways shall be used for communication to controllers installed under this section. Gateways may be used for communication to existing systems or to systems installed under other sections.
- B. Coordination Meeting: The Installer furnishing the DDC network shall meet with the Installer(s) furnishing each of the following products to coordinate details of the interface between these products and the DDC network. The Owner or his designated representative shall be present at this meeting. Each Installer shall provide the Owner and all other Installers with details of the proposed interface including PICS for BACnet equipment, hardware and software identifiers for the interface points, network identifiers, wiring requirements, communication speeds, and required network accessories. The purpose of this meeting shall be to insure there are no unresolved issues regarding the integration of these products into the DDC network. Submittals for these products shall not be approved prior to the completion of this meeting
- C. Communications with Third Party Equipment: Any additional integral control systems included with the products integrated with the work of this section shall be furnished with a BACnet interface for integration into the Direct Digital Control System described in this section.
- D. Provide all necessary BACnet-compliant hardware and software to meet the system's functional specifications.
- E. Prepare individual hardware layouts, interconnection drawings, and software configuration from project design data.
- F. Implement the detailed design for all analog and binary objects, system databases, graphic displays, logs, and management reports based on control descriptions, logic drawings, configuration data, and bid documents.
- G. Design, provide, and install all equipment cabinets, panels, data communication network cables needed, and all associated hardware.
- H. Provide and install all interconnecting cables between supplied cabinets, application controllers, and input/output devices.
- I. Provide complete manufacturer's specifications for all items that are supplied. Include vendor name of every item supplied.
- J. Provide as-built documentation, operator's terminal software, diagrams, and all other associated project operational documentation (such as technical manuals) on approved media, the sum total of which accurately represents the final system.

1.2 RELATED WORK IN OTHER SECTIONS

- A. Refer to Division 00 and Division 01 for related contractual requirements.
- B. Refer to Section 23 05 00 for General Mechanical Provisions.
- C. Refer to Section 26 00 00 for General Electrical Provisions.

1.3 REFERENCE STANDARDS

- A. The latest edition of the following standards and codes in effect and amended as of supplier's proposal date, and any applicable subsections thereof, shall govern design and selection of equipment and material supplied:
 - 1. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE).
 - 2. ANSI/ASHRAE Standard 135-2001, BACnet.
 - 3. Uniform Building Code (UBC), including local amendments.
 - 4. UL 916 Underwriters Laboratories Standard for Energy Management Equipment. Canada and the US.
 - 5. National Electrical Code (NEC).
 - 6. FCC Part 15, Subpart J, Class A.
- B. City, county, state, and federal regulations and codes in effect as of contract date.

1.4 SUBMITTALS

- A. Drawings:
 - 1. The system supplier shall submit engineered drawings, control sequence, and bill of materials for approval.
 - 2. Drawings shall be submitted in the following standard sizes: 11" x 17" (ANSI B).
 - 3. Eight complete sets (copies) of submittal drawings shall be provided.
 - 4. Drawings shall be available on CD-ROM.
- B. System Documentation Include the following in submittal package:
 - 1. System configuration diagrams in simplified block format.
 - 2. Electrical drawings that show all system internal and external connection points, terminal block layouts, and terminal identification.
 - 3. Complete bill of materials and valve schedule.
 - 4. Manufacturer's instructions and drawings for installation, maintenance, and operation of all purchased items.

1.5 QUALITY ASSURANCE

- A. Responsibility: The supplier of the EMCS shall be responsible for inspection and Quality Assurance (QA) for all materials and workmanship furnished.
- B. Component Testing: Maximum reliability shall be achieved through extensive use of high-quality, pre-tested components. Each and every controller, sensor, and all other DDC components shall be individually tested by the manufacturer prior to shipment.
- C. Tools, Testing and Calibration Equipment: The EMCS supplier shall provide all tools, testing, and calibration equipment necessary to ensure reliability and accuracy of the system.

- D. The systems control contractor shall have been in business as a controls contractor a minimum of five years, be able to verify successful installation and completion of at least five other projects similar in size and nature to this current project, and be the authorized installing contractor for the manufacturer of the BACnet components.
- E. Control system shall be engineered, programmed and supported completely by representative's local office that must be within 75 miles of project site.

1.6 WARRANTY

- A. Warranty shall cover all costs for parts, labor, associated travel, and expenses for a period of one year from completion of system acceptance.
- B. Hardware and software personnel supporting this warranty agreement shall provide on-site or off-site service in a timely manner after failure notification to the vendor. The maximum acceptable response time to provide this service at the site shall be 24 hours Monday through Friday, 48 hours on Saturday and Sunday.
- C. This warranty shall apply equally to both hardware and software.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Automatic Logic Corporation Version 6.0 or later (No Equal).

2.2 SYSTEM DESCRIPTION

- A. General: The control system shall consist of a high-speed, peer-to-peer network of DDC controllers and a web-based operator interface. Depict each mechanical system and building floor plan by a point-and-click graphic. A web server with a network interface card shall gather data from this system and generate web pages accessible through a conventional web browser on each PC connected to the network. Operators shall be able to perform all normal operator functions through the web browser interface.
- B. The system shall directly control HVAC equipment as specified in the control diagram sheet 3-M0.6 (Sequence of Operation). Each zone controller shall provide occupied and unoccupied modes of operation by individual zone. Furnish energy conservation features such as optimal start and stop, night setback, request-based logic, and demand level adjustment of set-points as specified in the Sequence of Operation.
- C. Building controllers shall include complete energy management software, including scheduling building control strategies with optimum start and logging routines. All energy management software and firmware shall be resident in field hardware and shall not be dependent on the operator's terminal. Operator's terminal software is to be used for access to field-based energy management functions only. Provide zone-by-zone direct digital logic control of space temperature, scheduling, runtime accumulation, equipment alarm reporting, and override timers for after-hours usage.
- D. All application controllers for every terminal unit (VAV, HP, UV, etc.) air handler, all central plant equipment, and any other piece of controlled equipment shall be fully programmable. Application controllers shall be mounted next to controlled equipment and communicate with building controller via BACnet LAN.

- E. Room sensors (where applicable) shall be provided with digital readout that allow the user to view room temperature, view outside air temperature, adjust the room setpoint within preset limits and set desired override time. Include all necessary wiring and firmware such that room sensor includes field service mode. Field service mode shall allow technician to balance VAV zones and access any parameter in zone controller.
- F. Provide for future system expansion to include monitoring of occupant card access, fire alarm, and lighting control systems.
- G. System shall use the BACnet protocol for communication to the operator workstation or web server and for communication between control modules. Schedules, setpoints, trends, and alarms specified in Control diagram sheet 3-M0.6 (Sequence of Operation) shall be BACnet objects

2.3 SYSTEM PERFORMANCE

- A. Performance Standards. System shall conform to the following minimum standards over network connections. Systems shall be tested using manufacturer's recommended hardware and software for operator workstation (server and browser for web-based systems).
 - 1. Graphic Display. A graphic with 20 dynamic points shall display with current data within 10 sec.
 - 2. Graphic Refresh. A graphic with 20 dynamic points shall update with current data within 8 sec. and shall automatically refresh every 15 sec.
 - 3. Configuration and Tuning Screens. Screens used for configuring, calibrating, or tuning points, PID loops, and similar control logic shall automatically refresh within 6 sec.
 - 4. Object Command. Devices shall react to command of a binary object within 2 sec. Devices shall begin reacting to command of an analog object within 2 sec.
 - 5. Alarm Response Time. An object that goes into alarm shall be annunciated at the workstation within 15 sec.
 - 6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 sec. Select execution times consistent with the mechanical process under control.
 - 7. Performance. Programmable controllers shall be able to completely execute DDC PID control loops at a frequency adjustable down to once per sec. Select execution times consistent with the mechanical process under control.
 - 8. Multiple Alarm Annunciation. Each workstation on the network shall receive alarms within 5 sec of other workstations.
 - 9. Reporting Accuracy. System shall report values with minimum end-to-end accuracy listed in Table 1.
 - 10. Control Stability and Accuracy. Control loops shall maintain measured variable at setpoint within tolerances listed in Table 2.

Table 1
Reporting Accuracy

Measured Variable	Reported Accuracy
Space Temperature	±0.5°C (±1°F)
Ducted Air	±0.5°C (±1°F)
Outside Air	±1.0°C (±2°F)
Dew Point	±1.5°C (±3°F)
Water Temperature	±0.5°C (±1°F)
Delta-T	±0.15°C (±0.25°F)
Relative Humidity	±5% RH
Water Flow	±2% of full scale
Airflow (terminal)	±10% of full scale (see Note 1)

Airflow (measuring stations)	±5% of full scale
Airflow (pressurized spaces)	±3% of full scale
Air Pressure (ducts)	±25 Pa (±0.1 in. w.g.)
Air Pressure (space)	±3 Pa (±0.01 in. w.g.)
Electrical (A, V, W, Power Factor)	±1% of reading (see Note 3)
Carbon Dioxide (CO ₂)	±50 ppm

Note 1: Accuracy applies to 10% - 100% of scale

Note 2: For both absolute and differential pressure

Note 3: Not including utility-supplied meters

Table 2
Control Stability and Accuracy

Controlled Variable	Control Accuracy	Range of Medium
Air Pressure	±0.2 in. w.g. ±0.01 in. w.g.	0-6 in. w.g. 0.1 to 0.1 in. w.g.
Airflow	±10% of full scale	
Space Temperature	±2.0°F	
Duct Temperature	±3°F	
Humidity	±5% RH	

2.4 MATERIALS

- A. Use new products the manufacturer is currently manufacturing and selling for use in new installations. Do not use this installation as a product test site unless explicitly approved in writing by Owner. Spare parts shall be available for at least five years after completion of this contract

2.5 COMMUNICATION

- A. Control products, communication media, connectors, repeaters, hubs, and routers shall comprise a BACnet internetwork. Controller and operator interface communication shall conform to ANSI/ASHRAE Standard 135, BACnet.
- B. Install new wiring and network devices as required to provide a complete and workable control network. Project drawings indicate remote buildings or sites to be connected by a nominal 56,000 baud modem over voice-grade telephone lines. In each remote location a modem and field device connection shall allow communication with each controller on the internetwork as specified in Paragraph D.
- C. Each controller shall have a communication port for temporary connection to a laptop computer or other operator interface. Connection shall support memory downloads and other commissioning and troubleshooting operations.
- D. Internetwork operator interface and value passing shall be transparent to internetwork architecture.
 1. An operator interface connected to a controller shall allow the operator to interface with each internetwork controller as if directly connected. Controller information such as data, status, and control algorithms shall be viewable and editable from each internetwork controller.
 2. Inputs, outputs, and control variables used to integrate control strategies across multiple controllers shall be readable by each controller on the internetwork. Program and test all cross-controller links required to execute control strategies specified in Control diagram sheet 2-M0.6. An authorized operator shall be able to edit cross-

controller links by typing a standard object address or by using a point-and-click interface.

- E. Controllers with real-time clocks shall use the BACnet Time Synchronization service. System shall automatically synchronize system clocks daily from an operator-designated controller via the internetwork. If applicable, system shall automatically adjust for daylight saving and standard time.
- F. System shall be expandable to at least twice the required input and output objects with additional controllers, associated devices, and wiring.
- G. System shall support Web services data exchange with any other system that complies with XML (extensible markup language) and SOAP (simple object access protocol) standards specified by the Web Services Interoperability Organization (WS-I) Basic Profile 1.0 or higher. Web services support shall as a minimum be provided at the workstation or web server level and shall enable data to be read from or written to the system.
 - 1. System shall support Web services read data requests by retrieving requested trend data or point values (I/O hardware points, analog value software points, or binary value software points) from any system controller or from the trend history database.
 - 2. System shall support Web services write data request to each analog and binary object that can be edited through the system operator interface by downloading a numeric value to the specified object.
 - 3. For read or write requests, the system shall require user name and password authentication and shall support SSL (Secure Socket Layer) or equivalent data encryption.
 - 4. System shall support discovery through a Web services connection or shall provide a tool available through the Operator Interface that will reveal the path/identifier needed to allow a third party Web services device to read data from or write data to any object in the system which supports this service.

2.6 OPERATOR INTERFACE

- A. Operator Interface. Web server shall reside on high-speed network with building controllers. Each standard browser connected to server shall be able to access all system information.
- B. Communication. Web server or workstation and controllers shall communicate using BACnet protocol. Web server or workstation and control network backbone shall communicate using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol and BACnet/IP addressing as specified in ANSI/ASHRAE 135, BACnet Annex J.
- C. Operator Functions. Operator interface shall allow each authorized operator to execute the following functions as a minimum:
 - 1. Log In and Log Out. System shall require user name and password to log in to operator interface.
 - 2. Point-and-click Navigation. Operator interface shall be graphically based and shall allow operators to access graphics for equipment and geographic areas using point-and-click navigation.
 - 3. View and Adjust Equipment Properties. Operators shall be able to view controlled equipment status and to adjust operating parameters such as setpoints, PID gains, on and off controls, and sensor calibration.
 - 4. View and Adjust Operating Schedules. Operators shall be able to view scheduled operating hours of each schedulable piece of equipment on a weekly or monthly calendar-based graphical schedule display, to select and adjust each schedule and time period, and to simultaneously schedule related equipment. System shall clearly show exception schedules and holidays on the schedule display.
 - 5. View and Respond to Alarms. Operators shall be able to view a list of currently active system alarms, to acknowledge each alarm, and to clear (delete) unneeded alarms.

6. View and Configure Trends. Operators shall be able to view a trend graph of each trended point and to edit graph configuration to display a specific time period or data range. Operator shall be able to create custom trend graphs to display on the same page data from multiple trended points.
7. View and Configure Reports. Operators shall be able to run preconfigured reports, to view report results, and to customize report configuration to show data of interest.
8. Manage Control System Hardware. Operators shall be able to view controller status, to restart (reboot) each controller, and to download new control software to each controller.
9. Manage Operator Access. Typically, only a few operators are authorized to manage operator access. Authorized operators shall be able to view a list of operators with system access and of functions they can perform while logged in. Operators shall be able to add operators, to delete operators, and to edit operator function authorization. Operator shall be able to authorize each operator function separately.

D. SYSTEM SOFTWARE.

1. System Graphics. Operator interface shall be graphically based and shall include at least one graphic per piece of equipment or occupied zone, graphics for each chilled water and hot water system, and graphics that summarize conditions on each floor of each building included in this contract.
 - a. Functionality. Graphics shall allow operator to monitor system status, to view a summary of the most important data for each controlled zone or piece of equipment, to use point-and-click navigation between zones or equipment, and to edit setpoints and other specified parameters.
 - b. Animation. Graphics shall be able to animate by displaying different image files for changed object status.
 - c. Alarm Indication. Indicate areas or equipment in an alarm condition using color or other visual indicator.
 - d. Format. Graphics shall be saved in an industry-standard format such as BMP, JPEG, PNG, or GIF. Web-based system graphics shall be viewable on browsers compatible with World Wide Web Consortium browser standards. Web graphic format shall require no plug-in (such as HTML and JavaScript) or shall only require widely available no-cost plug-ins (such as Active-X and Adobe Flash).

E. System Tools. System shall provide the following functionality to authorized operators as an integral part of the operator interface or as stand-alone software programs. If furnished as part of the interface, the tool shall be available from each workstation or web browser interface. If furnished as a stand-alone program, software shall be installable on standard IBM-compatible PCs with no limit on the number of copies that can be installed under the system license.

1. Automatic System Database Configuration. Each workstation or web server shall store on its hard disk a copy of the current system database, including controller firmware and software. Stored database shall be automatically updated with each system configuration or controller firmware or software change.
2. Controller Memory Download. Operators shall be able to download memory from the system database to each controller.
3. System Configuration. Operators shall be able to configure the system.
4. Online Help. Context-sensitive online help for each tool shall assist operators in operating and editing the system.
5. Security. System shall require a user name and password to view, edit, add, or delete data.
 - a. Operator Access. Each user name and password combination shall define accessible viewing, editing, adding, and deleting functions in each system application, editor, and object.
 - b. Automatic Log Out. Automatically log out each operator if no keyboard or mouse activity is detected. Operators shall be able to adjust automatic log out delay.

- c. Encrypted Security Data. Store system security data including operator passwords in an encrypted format. System shall not display operator passwords.
6. System Diagnostics. System shall automatically monitor controller and I/O point operation. System shall annunciate controller failure and I/O point locking (manual overriding to a fixed value).
7. Alarm Processing. System input and status objects shall be configurable to alarm on departing from and on returning to normal state. Operator shall be able to enable or disable each alarm and to configure alarm limits, alarm limit differentials, alarm states, and alarm reactions for each system object. Alarms shall be BACnet alarm objects and shall use BACnet alarm services.
8. Alarm Messages. Alarm messages shall use an English language descriptor without acronyms or mnemonics to describe alarm source, location, and nature.
9. Alarm Reactions. Operator shall be able to configure (by object) actions: workstation or web server shall initiate on receipt of each alarm. As a minimum, workstation or web server shall be able to log, print, start programs, display messages, send e-mail, send page, and audibly annunciate.
10. Alarm Maintenance. Operators shall be able to view system alarms and changes of state chronologically, to acknowledge and delete alarms, and to archive closed alarms to the workstation or web server hard disk from each workstation or web browser interface.
11. Trend Configuration. Operator shall be able to configure trend sample or change of value (COV) interval, start time, and stop time for each system data object and shall be able to retrieve data for use in spreadsheets and standard database programs. Controller shall sample and store trend data and shall be able to archive data to the hard disk. Trends shall be BACnet trend objects.
12. Object and Property Status and Control. Operator shall be able to view, and to edit if applicable, the status of each system object and property by menu, on graphics, or through custom programs.
13. Reports and Logs. Operator shall be able to select, to modify, to create, and to print reports and logs. Operator shall be able to store report data in a format accessible by standard spreadsheet and word processing programs.
14. Standard Reports. Furnish the following standard system reports:
 - a. Objects. System objects and current values filtered by object type, by status (in alarm, locked, normal), by equipment, by geographic location, or by combination of filter criteria.
 - b. Alarm Summary. Current alarms and closed alarms. System shall retain closed alarms for an adjustable period.
 - c. Logs. System shall log the following to a database or text file and shall retain data for an adjustable period:
 - 1) Alarm History.
 - 2) Trend Data. Operator shall be able to select trends to be logged.
 - 3) Operator Activity. At a minimum, system shall log operator log in and log out, control parameter changes, schedule changes, and alarm acknowledgment and deletion. System shall date and time stamp logged activity.
15. Custom Reports. Operator shall be able to create custom reports that retrieve data, including archived trend data, from the system, that analyze data using common algebraic calculations, and that present results in tabular or graphical format. Reports shall be launched from the operator interface.
16. Graphics Generation. Graphically based tools and documentation shall allow Operator to edit system graphics, to create graphics, and to integrate graphics into the system. Operator shall be able to add analog and binary values, dynamic text, static text, and animation files to a background graphic using a mouse.
17. Graphics Library. Complete library of standard HVAC equipment graphics shall include equipment such as chillers, boilers, air handlers, terminals, fan coils, and unit ventilators. Library shall include standard symbols for other equipment including fans, pumps, coils, valves, piping, dampers, and ductwork. Library graphic file format shall be compatible with graphics generation tools.

18. Custom Application Programming. Operator shall be able to create, edit, debug, and download custom programs. System shall be fully operable while custom programs are edited, compiled, and downloaded. Programming language shall have the following features:
- a. Language. Language shall be graphically based and shall use function blocks arranged in a logic diagram that clearly shows control logic flow. Function blocks shall directly provide functions listed below, and operators shall be able to create custom or compound function blocks.
 - b. Programming Environment. Tool shall provide a full-screen, cursor-and-mouse-driven programming environment that incorporates word processing features such as cut and paste. Operators shall be able to insert, add, modify, and delete custom programming code, and to copy blocks of code to a file library for reuse in other control programs.
 - c. Independent Program Modules. Operator shall be able to develop independently executing program modules that can disable, enable and exchange data with other program modules.
 - d. Debugging and Simulation. Operator shall be able to step through the program observing intermediate values and results. Operator shall be able to adjust input variables to simulate actual operating conditions. Operator shall be able to adjust each step's time increment to observe operation of delays, integrators, and other time-sensitive control logic. Debugger shall provide error messages for syntax and for execution errors.
 - e. Conditional Statements. Operator shall be able to program conditional logic using compound Boolean (AND, OR, and NOT) and relational (EQUAL, LESS THAN, GREATER THAN, NOT EQUAL) comparisons.
 - f. Mathematical Functions. Language shall support floating-point addition, subtraction, multiplication, division, and square root operations, as well as absolute value calculation and programmatic selection of minimum and maximum values from a list of values.
 - g. Variables: Operator shall be able to use variable values in program conditional statements and mathematical functions.
 - 1) Time Variables. Operator shall be able to use predefined variables to represent time of day, day of the week, month of the year, and date. Other predefined variables or simple control logic shall provide elapsed time in seconds, minutes, hours, and days. Operator shall be able to start, stop, and
 - 2) System Variables. Operator shall be able to use predefined variables to represent status and results of Controller Software and shall be able to enable, disable, and change setpoints of Controller Software as described in Controller Software section.

F. Portable Operator's Terminal. Provide all necessary software to configure an IBM-compatible laptop computer for use as a Portable Operator's Terminal. Operator shall be able to connect configured Terminal to the system network or directly to each controller for programming, setting up, and troubleshooting.

G. Operator Workstation: Web server or workstation shall conform to BACnet Operator Workstation (B-OWS) device profile or BACnet Advanced Workstation (B-AWS) as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-OWS or B-AWS in the BACnet Testing Laboratories (BTL) Product List.

2.7 CONTROLLER SOFTWARE

A. Building and energy management application software shall reside and operate in system controllers. Applications shall be editable through operator workstation, web browser interface, or engineering workstation.

- B. System Security. See Paragraph 2.6.E.5 (Security) and Paragraph 2.6.E.14.c(3) (Operator Activity).
- C. Scheduling. See Paragraph 2.6.C.4 (View and Adjust Operating Schedules). System shall provide the following schedule options as a minimum:
 - 1. Weekly. Provide separate schedules for each day of the week. Each schedule shall be able to include up to 5 occupied periods (5 start-stop pairs or 10 events).
 - 2. Exception. Operator shall be able to designate an exception schedule for each of the next 365 days. After an exception schedule has executed, system shall discard and replace exception schedule with standard schedule for that day of the week.
 - 3. Holiday. Operator shall be able to define 24 special or holiday schedules of varying length on a scheduling calendar that repeats each year.
- D. System Coordination. Operator shall be able to group related equipment based on function and location and to use these groups for scheduling and other applications.
- E. Binary and Analog Alarms. See Paragraph 2.6.E.7 (Alarm Processing).
- F. Alarm Reporting. See Paragraph 2.6.E.9 (Alarm Reactions).
- G. Remote Communication. System shall automatically contact operator workstation or server on receipt of critical alarms. If no network connection is available, system shall use a modem connection.
- H. Demand Limiting:
 - 1. System shall monitor building power consumption from building power meter pulse generator signals or from building feeder line watt transducer or current transformer.
 - 2. When power consumption exceeds adjustable levels, system shall automatically adjust setpoints, de-energize low-priority equipment, and take other programmatic actions to reduce demand. When demand drops below adjustable levels, system shall restore loads as specified.
- I. Maintenance Management. System shall generate maintenance alarms when equipment exceeds adjustable runtime, equipment starts, or performance limits.
- J. PID Control. System shall provide direct- and reverse-acting PID (proportional-integral-derivative) algorithms. Each algorithm shall have anti-windup and selectable controlled variable, setpoint, and PID gains. Each algorithm shall calculate a time-varying analog value that can be used to position an output or to stage a series of outputs.
- K. Staggered Start. System shall stagger controlled equipment restart after power outage. Operator shall be able to adjust equipment restart order and time delay between equipment restarts.
- L. Energy Calculations:
 - 1. System shall accumulate and convert instantaneous power (kW) or flow rates (L/s [gpm]) to energy usage data.
 - 2. System shall calculate a sliding-window average (rolling average). Operator shall be able to adjust window interval to 15 minutes, 30 minutes, or 60 minutes.
- M. Anti-Short Cycling. Binary output objects shall be protected from short cycling by means of adjustable minimum on-time and off-time settings.
- N. On and Off Control with Differential. System shall provide direct- and reverse-acting on and off algorithms with adjustable differential to cycle a binary output based on a controlled variable and setpoint.

- O. Runtime Totalization. System shall provide an algorithm that can totalize runtime for each binary input and output. Operator shall be able to enable runtime alarm based on exceeded adjustable runtime limit.

2.8 CONTROLLERS

- A. General. Provide Building Controllers (BC), Advanced Application Controllers (AAC), Application Specific Controllers (ASC), Smart Actuators (SA), and Smart Sensors (SS) as required to achieve performance specified in Section 23 0900 Article 1.9 (System Performance). Every device in the system which executes control logic and directly controls HVAC equipment must conform to a standard BACnet Device profile as specified in ANSI/ASHRAE 135, BACnet Annex L. Unless otherwise specified, hardwired actuators and sensors may be used in lieu of BACnet Smart Actuators and Smart Sensors.
- B. BACnet:
 - 1. Building Controllers (BCs). Each BC shall conform to BACnet Building Controller (B-BC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-BC in the BACnet Testing Laboratories (BTL) Product Listing.
 - 2. Advanced Application Controllers (AACs). Each AAC shall conform to BACnet Advanced Application Controller (B-AAC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-AAC in the BACnet Testing Laboratories (BTL) Product Listing.
 - 3. Application Specific Controllers (ASCs). Each ASC shall conform to BACnet Application Specific Controller (B-ASC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-ASC in the BACnet Testing Laboratories (BTL) Product Listing.
 - 4. Smart Actuators (SAs). Each SA shall conform to BACnet Smart Actuator (B-SA) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-SA in the BACnet Testing Laboratories (BTL) Product Listing.
 - 5. Smart Sensors (SSs). Each SS shall conform to BACnet Smart Sensor (B-SS) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-SS in the BACnet Testing Laboratories (BTL) Product Listing.
 - 6. BACnet Communication:
 - a. Each BC shall reside on or be connected to a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol and BACnet/IP addressing.
 - b. BACnet routing shall be performed by BCs or other BACnet device routers as necessary to connect BCs to networks of AACs and ASCs.
 - c. Each AAC shall reside on a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol with BACnet/IP addressing, or it shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.
 - d. Each ASC shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.
 - e. Each SA shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.
 - f. Each SS shall reside on a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol with BACnet/IP addressing, or it shall reside on a BACnet network using ARCNET or MS/TP Data Link/Physical layer protocol.
- C. Communication:
 - 1. Service Port. Each controller shall provide a service communication port for connection to a Portable Operator's Terminal. Connection shall be extended to space temperature sensor ports where shown on drawings.
 - 2. Signal Management. BC and ASC operating systems shall manage input and output communication signals to allow distributed controllers to share real and virtual object information and to allow for central monitoring and alarms.
 - 3. Data Sharing. Each BC and AAC shall share data as required with each networked BC and AAC.

4. Stand-Alone Operation. Each piece of equipment shall be controlled by a single controller to provide stand-alone control in the event of communication failure. All I/O points specified for a piece of equipment shall be integral to its controller. Provide stable and reliable stand-alone control using default values or other method for values normally read over the network.
- D. Environment. Controller hardware shall be suitable for anticipated ambient conditions.
1. Controllers used outdoors or in wet ambient conditions shall be mounted in waterproof enclosures and shall be rated for operation at -29°C to 60°C (-20°F to 140°F).
 2. Controllers used in conditioned space shall be mounted in dust-protective enclosures and shall be rated for operation at 0°C to 50°C (32°F to 120°F).
- E. Keypad. Provide a local keypad and display for each BC and AAC. Operator shall be able to use keypad to view and edit data. Keypad and display shall require password to prevent unauthorized use. If the manufacturer does not normally provide a keypad and display for each BC and AAC, provide the software and any interface cabling needed to use a laptop computer as a Portable Operator's Terminal for the system.
- F. Real-Time Clock. Controllers that perform scheduling shall have a real-time clock.
- G. Serviceability:
1. Controllers shall have diagnostic LEDs for power, communication, and processor.
 2. Wires shall be connected to a field-removable modular terminal strip or to a termination card connected by a ribbon cable.
 3. Each BC and AAC shall continually check its processor and memory circuit status and shall generate an alarm on abnormal operation. System shall continuously check controller network and generate alarm for each controller that fails to respond.
- H. Memory:
1. Controller memory shall support operating system, database, and programming requirements.
 2. Each BC and AAC shall retain BIOS and application programming for at least 72 hours in the event of power loss.
 3. Each ASC and SA shall use nonvolatile memory and shall retain BIOS and application programming in the event of power loss. System shall automatically download dynamic control parameters following power loss.
- I. Immunity to Power and Noise. Controllers shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m (3 ft).
- J. Transformer. ASC power supply shall be fused or current limiting and shall be rated at a minimum of 125% of ASC power consumption.

2.9 INPUT AND OUTPUT INTERFACE

- A. General. Hard-wire input and output points to BCs, AACs, ASCs, or SAs.
- B. Protection. Shorting an input or output point to itself, to another point, or to ground shall cause no controller damage. Input or output point contact with up to 24 V for any duration shall cause no controller damage.
- C. Binary Inputs. Binary inputs shall monitor the on and off signal from a remote device. Binary inputs shall provide a wetting current of at least 12 mA and shall be protected against contact bounce and noise. Binary inputs shall sense dry contact closure without application of power external to the controller.

- D. Pulse Accumulation Inputs. Pulse accumulation inputs shall conform to binary input requirements and shall accumulate up to 10 pulses per second.
- E. Analog Inputs. Analog inputs shall monitor low-voltage (0-10 Vdc), current (4-20 mA), or resistance (thermistor or RTD) signals. Analog inputs shall be compatible with and field configurable to commonly available sensing devices.
- F. Binary Outputs. Binary outputs shall send an on-or-off signal for on and off control. Building Controller binary outputs shall have three-position (on-off-auto) override switches and status lights. Outputs shall be selectable for normally open or normally closed operation.
- G. Analog Outputs. Analog outputs shall send a modulating 0-10 Vdc or 4-20 mA signal as required to properly control output devices. Each Building Controller analog output shall have a two-position (auto-manual) switch, a manually adjustable potentiometer, and status lights. Analog outputs shall not drift more than 0.4% of range annually.
- H. Tri-State Outputs. Control three-point floating electronic actuators without feedback with tri-state outputs (two coordinated binary outputs). Tri-State outputs may be used to provide analog output control in zone control and terminal unit control applications such as VAV terminal units, duct-mounted heating coils, and zone dampers.
- I. Universal Inputs and Outputs. Inputs and outputs that can be designated as either binary or analog in software shall conform to the provisions of this section that are appropriate for their designated use.

2.10 POWER SUPPLIES AND LINE FILTERING

- A. Power Supplies. Control transformers shall be UL listed. Furnish Class 2 current-limiting type or furnish over-current protection in primary and secondary circuits for Class 2 service in accordance with NEC requirements. Limit connected loads to 80% of rated capacity.
 - 1. DC power supply output shall match output current and voltage requirements. Unit shall be full-wave rectifier type with output ripple of 5.0 mV maximum peak-to-peak. Regulation shall be 1.0% line and load combined, with 100-microsecond response time for 50% load changes. Unit shall have built-in over-voltage and over-current protection and shall be able to withstand 150% current overload for at least three seconds without trip-out or failure.
 - a. Unit shall operate between 0°C and 50°C (32°F and 120°F). EM/RF shall meet FCC Class B and VDE 0871 for Class B and MILSTD 810C for shock and vibration.
 - b. Line voltage units shall be UL recognized and CSA listed.
- B. Power Line Filtering:
 - 1. Provide internal or external transient voltage and surge suppression for workstations and controllers. Surge protection shall have:
 - a. Dielectric strength of 1000 V minimum
 - b. Response time of 10 nanoseconds or less
 - c. Transverse mode noise attenuation of 65 dB or greater
 - d. Common mode noise attenuation of 150 dB or greater at 40-100 Hz

2.11 AUXILIARY CONTROL DEVICES

- A. Motorized Control Dampers:
 - 1. Type. Control dampers shall have linear flow characteristics and shall be parallel- or opposed-blade type as specified below or as scheduled on drawings.
 - a. Outdoor and return air mixing dampers and face-and-bypass dampers shall be parallel-blade and shall direct airstreams toward each other.
 - b. Other modulating dampers shall be opposed-blade.

- c. Two-position shutoff dampers shall be parallel- or opposed-blade with blade and side seals.
 2. Frame. Damper frames shall be 2.38 mm (13 gauge) galvanized steel channel or 3.175 mm (1/8 in.) extruded aluminum with reinforced corner bracing.
 3. Blades. Damper blades shall not exceed 20 cm (8 in.) in width or 125 cm (48 in.) in length. Blades shall be suitable for medium velocity (10 m/s [2000 fpm]) performance. Blades shall be not less than 1.5875 mm (16 gauge).
 4. Shaft Bearings. Damper shaft bearings shall be as recommended by manufacturer for application, oil impregnated sintered bronze, or better.
 5. Seals. Blade edges and frame top and bottom shall have replaceable seals of butyl rubber or neoprene. Side seals shall be spring-loaded stainless steel. Blade seals shall leak no more than 50 L/s·m² (10 cfm per ft²) at 1000 Pa (4 in. w.g.) differential pressure. Blades shall be airfoil type suitable for wide-open face velocity of 7.5 m/s (1500 fpm).
 6. Sections. Damper sections shall not exceed 125 cm - 150 cm (48 in. - 60 in.). Each section shall have at least one damper actuator.
 7. Linkages. Dampers shall have exposed linkages.
- B. Electric Damper and Valve Actuators:
1. Stall Protection. Mechanical or electronic stall protection shall prevent actuator damage throughout the actuator's rotation.
 2. Spring-return Mechanism. Actuators used for power-failure and safety applications shall have an internal mechanical spring-return mechanism or an uninterruptible power supply (UPS).
 3. Signal and Range. Proportional actuators shall accept a 0-10 Vdc or a 0-20 mA control signal and shall have a 2-10 Vdc or 4-20 mA operating range. (Floating motor actuators may be substituted for proportional actuators in terminal unit applications as described in paragraph 2.6H.)
 4. Wiring. 24 Vac and 24 Vdc actuators shall operate on Class 2 wiring.
 5. Manual Positioning. Operators shall be able to manually position each actuator when the actuator is not powered. Non-spring-return actuators shall have an external manual gear release. Spring-return actuators with more than 7 N·m (60 in.-lb) torque capacity shall have a manual crank.
- C. Binary Temperature Devices:
1. Low-Voltage Space Thermostats. Low-voltage space thermostats shall be 24 V, bimetal-operated, mercury-switch type, with adjustable or fixed anticipation heater, concealed setpoint adjustment, 13°C-30°C (55°F-85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover.
 2. Line-Voltage Space Thermostats. Line-voltage space thermostats shall be bimetal-actuated, open-contact type or bellows-actuated, enclosed, snap-switch type or equivalent solid-state type, with heat anticipator, UL listing for electrical rating, concealed setpoint adjustment, 13°C-30°C (55°F-85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover.
 3. Low-Limit Thermostats. Low-limit airstream thermostats shall be UL listed, vapor pressure type. Element shall be at least 6 m (20 ft) long. Element shall sense temperature in each 30 cm (1 ft) section and shall respond to lowest sensed temperature. Low-limit thermostat shall be manual reset only.
- D. Temperature Sensors:
1. Type. Temperature sensors shall be Resistance Temperature Device (RTD) or thermistor.
 2. Duct Sensors. Duct sensors shall be single point or averaging as shown. Averaging sensors shall be a minimum of 1.5 m (5 ft) in length per 1 m²(10 ft²) of duct cross-section.
 3. Immersion Sensors. Provide immersion sensors with a separable stainless steel well. Well pressure rating shall be consistent with system pressure it will be immersed in. Well shall withstand pipe design flow velocities.

4. Space Sensors. Space sensors shall have setpoint adjustment, override switch, display, and communication port as shown.
 5. Differential Sensors. Provide matched sensors for differential temperature measurement.
- E. Flow Switches: Differential pressure type (air service) as shown. Switches shall be UL listed, SPDT snap-acting, and pilot duty rated (125 VA minimum).
1. Differential pressure switches shall have scale range and differential suitable for intended application and NEMA 1 enclosure unless otherwise specified.
- F. Relays:
1. Control Relays. Control relays shall be plug-in type, UL listed, and shall have dust cover and LED "energized" indicator. Contact rating, configuration, and coil voltage shall be suitable for application.
 2. Time Delay Relays. Time delay relays shall be solid-state plug-in type, UL listed, and shall have adjustable time delay. Delay shall be adjustable $\pm 100\%$ from setpoint shown. Contact rating, configuration, and coil voltage shall be suitable for application. Provide NEMA 1 enclosure for relays not installed in local control panel.
- G. Override Timers:
1. Unless implemented in control software, override timers shall be spring-wound line voltage, UL Listed, with contact rating and configuration required by application. Provide 0-6 hour calibrated dial unless otherwise specified. Flush mount timer on local control panel face or where shown.
- H. Current Transmitters:
1. AC current transmitters shall be self-powered, combination split-core current transformer type with built-in rectifier and high-gain servo amplifier with 4-20 mA two-wire output. Full-scale unit ranges shall be 10 A, 20 A, 50 A, 100 A, 150 A, and 200 A, with internal zero and span adjustment. Unit accuracy shall be $\pm 1\%$ full-scale at 500 ohm maximum burden.
 2. Transmitter shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized.
 3. Unit shall be split-core type for clamp-on installation on existing wiring.
- I. Current Transformers:
1. AC current transformers shall be UL/CSA recognized and shall be completely encased (except for terminals) in approved plastic material.
 2. Transformers shall be available in various current ratios and shall be selected for $\pm 1\%$ accuracy at 5 A full-scale output.
 3. Use fixed-core transformers for new wiring installation and split-core transformers for existing wiring installation.
- J. Voltage Transmitters:
1. AC voltage transmitters shall be self-powered single-loop (two-wire) type, 4-20 mA output with zero and span adjustment.
 2. Adjustable full-scale unit ranges shall be 100-130 Vac, 200-250 Vac, 250-330 Vac, and 400-600 Vac. Unit accuracy shall be $\pm 1\%$ full-scale at 500 ohm maximum burden.
 3. Transmitters shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized at 600 Vac rating.
- K. Voltage Transformers:
1. AC voltage transformers shall be UL/CSA recognized, 600 Vac rated, and shall have built-in fuse protection.
 2. Transformers shall be suitable for ambient temperatures of 4°C - 55°C (40°F - 130°F) and shall provide $\pm 0.5\%$ accuracy at 24 Vac and 5 VA load.
 3. Windings (except for terminals) shall be completely enclosed with metal or plastic.

- L. Power Monitors:
 - 1. Power monitors shall be three-phase type and shall have three-phase disconnect and shorting switch assembly, UL listed voltage transformers, and UL listed split-core current transformers.
 - 2. Power monitors shall provide selectable output: rate pulse for kWh reading or 4-20 mA for kW reading. Power monitors shall operate with 5 A current inputs and maximum error of $\pm 2\%$ at 1.0 power factor or $\pm 2.5\%$ at 0.5 power factor.
- M. Current Switches:
 - 1. Current-operated switches shall be self-powered, solid-state with adjustable trip current. Select switches to match application current and DDC system output requirements.
- N. Pressure Transducers:
 - 1. Transducers shall have linear output signal and field-adjustable zero and span.
 - 2. Continuous operating conditions of positive or negative pressure 50% greater than calibrated span shall not damage transducer sensing elements.
 - 3. Water pressure transducer diaphragm shall be stainless steel with minimum proof pressure of 1000 kPa (150 psi). Transducer shall have 4-20 mA output, suitable mounting provisions, and block and bleed valves.
 - 4. Water differential pressure transducer diaphragm shall be stainless steel with minimum proof pressure of 1000 kPa (150 psi). Over-range limit (differential pressure) and maximum static pressure shall be 2000 kPa (300 psi.) Transducer shall have 4-20 mA output, suitable mounting provisions, and 5-valve manifold.
- O. Differential Pressure Switches. Differential pressure switches (air or water service) shall be UL listed, SPDT snap-acting, pilot duty rated (125 VA minimum) and shall have scale range and differential suitable for intended application and NEMA 1 enclosure unless otherwise specified.
- P. Pressure-Electric (PE) Switches: PE switches shall be UL listed, pilot duty rated (125 VA minimum) or motor control rated, metal or neoprene diaphragm actuated, operating pressure rated for 0-175 kPa (0-25 psig), with calibrated scale minimum setpoint range of 14-125 kPa (2-18 psig).
 - 1. Provide one- or two-stage switch action (SPDT, DPST, or DPDT) as required by application.
 - 2. Switches shall be open type (panel-mounted). Exception: Switches shall be enclosed type for remote installation. Enclosed type shall be NEMA 1 unless otherwise specified.
 - 3. Each pneumatic signal line to PE switches shall have permanent indicating gauge.
- Q. Local Control Panels:
 - 1. Indoor control panels shall be fully enclosed NEMA 1 construction with hinged door key-lock latch and removable sub-panels. A common key shall open each control panel and sub-panel.
 - 2. Prewire internal and face-mounted device connections with color-coded stranded conductors tie-wrapped or neatly installed in plastic troughs. Field connection terminals shall be UL listed for 600 V service, individually identified per control and interlock drawings, with adequate clearance for field wiring.
 - 3. Each local panel shall have a control power source power switch (on-off) with overcurrent protection.

2.12 WIRING AND RACEWAYS

- A. General. Provide copper wiring, plenum cable, and raceways as specified in applicable sections of Division 26.

- B. Insulated wire shall use copper conductors and shall be UL listed for 90°C (200°F) minimum service.

PART 3 - EXECUTION

3.1 INSTALLATION (GENERAL)

- A. Install in accordance with manufacturer's instructions.
- B. Provide all miscellaneous devices, hardware, software, interconnections installation and programming required to ensure a complete operating system in accordance with the sequences of operation and point schedules.

3.2 LOCATION AND INSTALLATION OF COMPONENTS

- A. Locate and install components for easy accessibility; in general, mount 48 inches above floor with minimum 3'-0" clear access space in front of units.
- B. All instruments, switches, transmitters, etc., shall be suitably wired and mounted to protect them from vibration, moisture and high or low temperatures.
- C. Provide stainless steel or brass thermowells suitable for respective application and for installation under other sections—sized to suit pipe diameter without restricting flow.

3.3 INTERLOCKING AND CONTROL WIRING

- A. All wiring shall be installed neatly and professionally, in accordance with all national, state and local electrical codes.
- B. Provide wiring as required by functions as specified and as recommended by equipment manufacturers, to serve specified control functions. Provide shielded low capacitance wire for all communications trunks.
- C. Control wiring shall not be installed in power circuit raceways. Magnetic starters and disconnect switches shall not be used as junction boxes. Provide auxiliary junction boxes as required. Coordinate location and arrangement of all control equipment with the owner's representative prior to rough-in.
- D. Provide auxiliary pilot duty relays on motor starters as required for control function.
- E. All control wiring in the mechanical, electrical, telephone and boiler rooms to be installed in raceways. Plenum rated cable without conduit may be used in concealed but accessible locations provided it is installed in a neat and inconspicuous manner per local code requirements.

3.4 TRAINING

- A. Provide application engineer to instruct owner in operation of systems and equipment.
- B. Provide system operator's training to include such items as the following: modification of data displays, alarm and status descriptors, requesting data, execution of commands and request of logs. Provide this training to a minimum of 2 persons.

- C. Provide on-site training above as required, up to 16 hours as part of this contract.

PART 4 - SEQUENCE OF OPERATIONS

4.1 GENERAL

- A. Provide a complete and operational temperature control and building automation system based on the following points and sequence of operation in the specification drawings. The system shall be complete as to sequences and standard control practices
- B. BACnet Object List:
1. The following points as defined for each piece of equipment are designated as follows:
 - a. Digital Out (DO): Defined as any two-state output (start/stop), (enable/disable), etc.
 - b. Digital In (DI): Defined as any two-state input (alarm, status), etc.
 - c. Analog Out (AO): Defined as any electrical variable output. 0-20mA, 4-20mA and 0-10VDC are the only acceptable analog outputs. The driver for analog outputs must come from both hardware and software resident in the controllers. Transducers will not be acceptable under any circumstances.
 - d. Analog In (AI): Defined as any variable input (temperature), (position), (pressure), etc.

END OF SECTION

06/08/18

SECTION 23 31 00

DUCTWORK AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Ductwork.
 - 2. Volume dampers.
 - 3. Motorized damper
 - 4. Fire smoke damper
 - 5. Duct smoke detector
 - 6. Turning vanes.
 - 7. Flexible ducts.
 - 8. Duct accessory hardware.
 - 9. Duct Adhesives, Sealants, and Caulks
 - 10. Duct Cleaning.

1.3 SUBMITTALS

- A. Product data for the following:
 - 1. Volume dampers.
 - 2. Fire smoke damper
 - 3. Duct smoke detector
 - 4. Turning Vanes.
 - 5. Flexible ducts.
 - 6. Duct Sealants.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Special fittings.
 - 2. Manual-volume damper installations.
- C. Coordination Drawings: Reflected ceiling plans, drawn to scale and coordinating penetrations and ceiling-mounting items. Show ceiling-mounting access panels and access doors required for access to duct accessories.

1.4 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems".

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to the product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 SHEET METAL MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated on drawings and as herein specified.
- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A653 and having G60 coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.
- C. Stainless Steel: ASTM A480.
- D. Aluminum Sheets: ASTM B209, alloy 3003, temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- E. Extruded Aluminum: ASTM B221, alloy 6063, temper T6.
- F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
- G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 BACK-DRAFT DAMPERS

- A. Manufacturers
 - 1. Air Balance, Inc.
 - 2. American Warming and Ventilating.
 - 3. CESCO Products.
 - 4. Duro Dyne Corp.
 - 5. Greenheck.
 - 6. Penn Ventilation Company, Inc.
 - 7. Prefco Products, Inc.

8. Ruskin Company.
 9. Vent Products Company, Inc.
- B. Description: Multiple-blade, parallel action gravity balanced, with center-pivoted blades of maximum 6-inch width, with sealed edges, assembled in rattle-free manner with 90-degree stop, steel ball bearings, and axles; adjustment device to permit setting for varying differential static pressure.
 - C. Frame: 0.052-inch thick, galvanized sheet steel with welded corners and mounting flange.
 - D. Blade Seals: Neoprene.
 - E. Blade Axles: Galvanized steel.
 - F. Tie Bars and Brackets: Galvanized steel.
 - G. Return Spring: Adjustable tension.

2.4 VOLUME DAMPERS

- A. Manufacturers:
 1. Air Balance, Inc.
 2. American Warming and Ventilating.
 3. Flexmaster U.S.A., Inc.
 4. McGill AirFlow Corporation.
 5. METALAIRE, Inc.
 6. Nailor Industries Inc.
 7. Penn Ventilation Company, Inc.
 8. Ruskin Company.
 9. Vent Products Company, Inc.
- B. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
 1. Pressure Classes of 3-inch w.g. or higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.
- C. Standard Volume Dampers: single-blade design as indicated, standard leakage rating, with linkage outside air stream, and suitable for horizontal or vertical applications.
 1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
 2. Roll-Formed Steel Blades: 0.064-inch thick, galvanized sheet steel.
 3. Blade Axles: Galvanized steel.
 4. Bearings: Molded synthetic.
 5. Bars and Brackets: Galvanized steel.

- D. Jackshaft: One-inch- diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 - 1. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.
- E. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch thick zinc-plated steel, and a 3/4-inch hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.5 DAMPER REGULATORS

- A. Manufacturers:
 - 1. Ventfabrics.
 - 2. Ventlock.
 - 3. Young.
- B. At accessible dampers, provide locking quadrant operators.
 - 1. Un-insulated ducts: Young No. 403.
 - 2. Insulated ducts: Young No. 403B
- C. At inaccessible dampers, provide with remote operators.
 - 1. Flush to Ceiling: Young 270-301-EZ mounting bracket for Bowden Cable Controls. Use with Young 5020CC round or 830ACC rectangular dampers OR 270-301-EZ-B kit for dampers furnished separately.
 - 2. Alternatively provide Young 270-275 for controller mounted in diffuser/register.

2.6 COMBINATION FIRE AND SMOKE DAMPERS

- A. Manufacturers:
 - 1. Air Balance, Inc.
 - 2. CESCO Products.
 - 3. Greenheck.
 - 4. Nailor Industries Inc.
 - 5. Ruskin Company.
- B. General Description: Labeled according to UL 555S. Combination fire and smoke dampers shall be labeled according to UL 555 for 1-1/2-hour rating.
- C. Fusible Links: Replaceable, 212°F according to manufacturer's UL-approved written instructions.
- D. Frame and Blades: 0.064-inch thick, galvanized sheet steel.
- E. Mounting Sleeve: Factory-installed, 0.052-inch thick, galvanized sheet steel; length to suit wall or floor application.
- F. Integral Duct Smoke Detector: Factory mounted and wired "No Flow" Duct Smoke Detector with addressable relay. Photoelectric type with appropriate length sampling tubes. Unit shall be wired under Division 16 for power and alarm system.

- G. Damper Motors: Modulating and two-position action.
1. Comply with requirements in Division 15 Section "Motors."
 2. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
 3. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf and breakaway torque rating of 150 in. x lbf.
 4. Electrical Connection: 115 V, single phase, 60 Hz.

2.7 DUCT MOUNTED SMOKE DETECTORS

- A. Duct type smoke detectors: Photoelectric type with appropriate length sampling tubes. Units shall be furnished and installed in air ducts by mechanical contractor, where indicated on the mechanical drawings. Pyrotonics AD-3XRILP with auxiliary contacts rated at 1 amp @ 120 VAC. Unit shall be wired under Division 16 for power and alarm system. Control wiring furnished and installed under Division 15.

2.8 TURNING VANES

- A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.
- B. Manufactured Turning Vanes: Fabricate 1-1/2-inch wide, [single] [double]-vane, curved blades of galvanized sheet steel set 3/4 inch o.c.; support with bars perpendicular to blades set 2 inches o.c.; and set into vane runners suitable for duct mounting.
1. Available Manufacturers:
 - a. Ductmate Industries, Inc.
 - b. Duro Dyne Corp.
 - c. METALAIRE, Inc.
- C. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
1. Airsan Acoustiturn or equal.

2.9 FLEXIBLE CONNECTORS

- A. Available Manufacturers:
1. Ductmate Industries, Inc.
 2. Duro Dyne Corp.
 3. Ventfabrics, Inc.
 4. Ward Industries, Inc.
- B. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.
- C. Metal-Edged Connectors: Factory fabricated with a fabric strip 3-1/2 inches wide attached to two strips of 2-3/4-inch wide, 0.028-inch thick, galvanized sheet steel. Select metal compatible with ducts.

- D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - 1. Minimum Weight: 26 oz./sq. yd.
 - 2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
 - 3. Service Temperature: Minus 40 to plus 200°F.
- E. Service Temperature: Minus 67 to plus 500°F.

2.10 FLEXIBLE DUCTS

- A. Available Manufacturers:
 - 1. Flexmaster U.S.A., Inc.
 - 2. Hart & Cooley, Inc.
 - 3. McGill AirFlow Corporation.
- B. Insulated-Duct Connectors: UL 181, Class 1, multiple layers of aluminum laminate supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor barrier film.
 - 1. Pressure Rating: 10-inch w.g. positive and 1.0-inch w.g. negative.
 - 2. Maximum Air Velocity: 4000 fpm.
 - 3. Temperature Range: Minus 20 to plus 210°F.
- C. Flexible Duct Clamps: Nylon strap in sizes 3 through 18 inches to suit duct size.

2.11 ROOF AND WALL JACKS (CAPS) AND FLASHING

- A. Wall jacks, caps and dryer vents: Greenheck.
- B. Sloped roof: as manufactured by Greenheck, Low Pressure Roof Cap with integral backdraft damper; galvanized steel G-90.
- C. Flat roof: as manufactured by Greenheck, Spun Aluminum Roof Cap with screen, no damper.
- D. Metal roof flashing: Master Flash EDPM Rubber pipe and duct flashing boot.

2.12 DUCT ACCESSORY HARDWARE

- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct insulation thickness.
- B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

2.13 DUCT ADHESIVES, SEALANTS AND CAULKS

- A. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers, and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits, as shown in Tables 5.504.4.1 and 5.504.4.2. Such products also shall comply with the Rule 1168 prohibition

on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene), except for aerosol products specified in subsection B, below.

- B. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
- B. Verify that the mechanical system may be installed in complete accordance with all pertinent codes and regulations and the approved shop drawings.
- C. Verify all dimensions at the site making all field measurements and shop drawings necessary for fabrication and erection of sheet metal work. Dimensions shown are net free areas. Make allowances for beams, pipes or other obstructions in building construction and for work of other contractors. Check plans showing work of other trades and consult with Architect in the event of any interference.

3.2 DISCREPANCIES

- A. In the event of discrepancy, immediately notify Architect.
- B. Do not proceed with the installation in areas of discrepancies until all such discrepancies have been fully resolved.

3.3 APPLICATION AND INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts.
- B. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
- C. Install back draft dampers on outside air intakes, exhaust fans, or exhaust ducts nearest to outside and where indicated.
- D. Install volume dampers in ducts with liner; avoid damage to and erosion of duct liner.
- E. Provide balancing dampers at points on supply, return, and exhaust systems where branches lead from larger ducts as required for air balancing. Install at a minimum of two duct widths from branch takeoff.
- F. Provide test holes at fan inlets and outlets and elsewhere as indicated.

- G. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories and terminal units as follows:
- H. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.
- I. Install duct test holes where indicated and required for testing and balancing purposes.
- J. At the time of rough installation, or during storage on the construction site and until final startup of the heating and cooling 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.

3.4 ADJUSTING

- A. Adjust duct accessories for proper settings.
- B. Adjust fire and smoke dampers for proper action.
- C. Final positioning of manual-volume dampers is specified in Section 15990 Testing, Adjusting, and Balancing."

3.5 DUCTWORK AND ACCESSORIES

- A. Fabricate and support in accordance with 2010 California Mechanical Code, SMACNA HVAC Duct Construction Standards Metal and Flexible, and ASHRAE handbooks, except as indicated. Gages for galvanized steel ducts for low pressure systems up to 2" w.g. shall be as follows:

RECTANGULAR DUCT		ROUND DUCT		
Dimension of Largest (L) Side, in Inches	Ga.	Diameter (D) in Inches	Long Seam	Spiral Seam
			Ga.	Ga.
L<12	26	D<8	28	28
12<L≤30	24	8<D≤14	26	28
30<L≤54	22	14<D≤16	24	26
54<L≤84	20	16<D≤18	24	24
84<L	18	18<D≤26	22	24
		26<D≤36	20	22
		36<D≤50	20	20
		50<D≤60	18	18
		60<D≤84	16	18
Note: Exposed spiral ductwork shall be one (1) gauge heavier				

- B. Verify all dimensions at the site making all field measurements and shop drawings necessary for fabrication and erection of sheet metal work. Dimensions shown are net free areas. Lined ducts shall be fabricated so that new dimensions to inside of lining shall equal the sizes shown on drawings.
- C. Make allowances for beams, pipes or other obstructions in building construction and for work of other trades. Check plans showing work of other trades and consult with Architect in the event of any interference.
- D. Fittings: Manufactured fittings for all exposed ductwork. Use slop fit couplings for all pipe joints. All fittings are to be continuously welded. Where the zinc coating has been burned

during fabrication, the fittings are to be painted by the manufacturer.

- E. Low Pressure Ductwork: Sheet metal gauges, transverse joint type and spacing, reinforcing type and spacing, In accordance with latest ASHRAE and SMACNA Schedules for low-pressure ductwork. Figures below are from the SMACNA Manual
- F. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by written permission.
- G. Elbows shall be standard radius or square with vanes as shown on Fig 2-2, 3, 4, 5, 6, & 7. Single vanes with 3/4" trailing edge are preferred. Adjust the vanes so that the railing edges are parallel with the downstream duct when entering and leaving duct sizes are not equal. Turning vanes used in acoustically lined duct shall use an acoustical noise reduction turning vane.
- H. Offsets and taper: Fig 2-9 & 10; branch connections: Fig 2-7 & 8 or as indicated on the drawings.
- I. Round tees and laterals: Fig 3-4 & 5 except straight tees are not acceptable.
- J. Junctions between ducts: Branch take-off with 45° or 90° tapered spin-in. No branch duct to intersect main duct on bottom.
- K. Seal all longitudinal and transverse duct and plenum joints and field formed seams airtight (Seal Class B) with medium water based, low VOC, pressure duct sealant.
- L. Joints between ducts: Make with beaded sleeve joints. Apply duct sealer to male end. Mechanically fasten with sheet metal screws or pop rivets. Over joint and screw or rivet heads, apply coating of duct sealer. Cover entire joint with duct tape.
- M. Supports for ducts and plenums shall be band iron supports according to Section IV.
- N. All ductwork shall be concealed behind finished wall, ceilings or floors unless specifically noted "exposed" on the drawings. Ductwork shown to be exposed shall be installed to provide maximum headroom and/or floor space.
- O. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.
- P. Access Panels and Doors in Ductwork: Provide in ductwork as indicated and wherever necessary or required for proper access to all instruments, controls, fire and automatic dampers and equipment and for convenient inspection and maintenance. Size as approved by Architect.
- Q. Install ductwork of sizes, runs and connections as shown on drawings.
- R. Fabricate ductwork in workman-like manner with airtight joints; presenting smooth surfaces on inside, neatly finished on outside; construct with curves, bends; turning vanes to aid in easy flow of air. Make internal ends of slip joints in directions of air flow.
- S. Install ductwork to provide maximum headroom.
- T. Adjust ducts to suit local conditions. Alter duct sizes on basis of equal friction where required to facilitate installation.
- U. Provide ductwork connected to air-handling equipment or air inlet and outlet devices, with

all necessary transformation pieces, flexible fabric connections as required. Secure fabric connectors tightly to fans, casings and ducts. Allow at least 1" slack in connections. Do not paint fabric connectors. Provide galvanized steel weather shield over exterior top and sides of exposed flexible connections.

- V. Diagonally or transversely cross break all panels on metal rectangular ducts over 18" in either direction.
- W. Avoid penetration of ducts. Provide airtight rubber grommets at unavoidable penetrations of hanger rods.
- X. Duct Openings: Provide openings where required to accommodate thermometers, smoke detectors, controllers, etc.
- Y. Provide pitot tube openings where required for testing of systems: Complete with metal cap with spring device or screw to ensure against air leakage.
- Z. Where openings are provided in insulated ductwork, install insulation material inside metal ring.

3.6 DUCT HANGERS AND SUPPORTS

- A. General: Attachment to structure, as specified in Section 23 05 00, "GENERAL MECHANICAL PROVISIONS".
- B. Install hangers for ducts as specified in the SMACNA Manual.
- C. Upper Hanger Attachments:
 - 1. Attachment to Metal frame roof in Building M, Concrete metal deck floor and Epicore deck roof in Building A:
 - a. Secure hangers to overhead construction with sheet metal screw or anchor bolt.
 - b. Secure hanger attachment required to be supported from wall to floor construction with single unit expansion shields or self-drilling type expansion shields and machine bolts.
- D. Duct Riser Supports:
 - 1. Unless otherwise specified or shown, support vertical ducts by means of two steel angles, riveted to duct and resting on floor slab or adjacent structural steel members and specified vibration isolators at every floor through which the duct passes. Size supports as follows (all dimensions in inches):

Max. Side Dimensions in Inches	Support Angle	Secure to Duct Width	Minimum Bearing Each End
36	1 x 1 x 1/8	Screws	2
48	1-1/2 x 1-1/2 x 1/8	Bolts	3
60	2 x 2 x 1/8	Bolts	3
Over 60	2-1/2 x 2-1/2 x 3/16	Bolts	4

3.7 FLEXIBLE DUCT

- A. Do not use flexible duct for duct connection through walls or gypsum board.
- B. Use insulated flex duct on run-outs to air outlets. Maximum flexible duct length duct length of 7-feet. Bends greater than 90-degrees not permitted.

- C. Flex duct on exhaust same as above but without insulation.
- D. Connect flexible ducts with liquid adhesive plus tape, draw band, or adhesive plus sheet metal screens.

3.8 DUCT CLEANING

- A. Oil film on sheet metal shall be removed prior to shipment to site. Ducts shall be inspected on site to confirm that no oil is present; remove oil if so detected. If ducts contain dust and dirt, clean the ducts immediately, prior to substantial completion and prior to using the ducts to circulate air.
- B. Clean duct system and force air at high velocity through duct to remove accumulated dust during construction. To obtain sufficient air, clean half the system at a time. Protect equipment that may be harmed by excessive dirt with temporary filters or bypass during cleaning.

END OF SECTION

06/08/18

SECTION 23 37 13

AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 1 Specification Section, apply to this Section.
- B. Coordinate with Architect location of air outlets and inlets.

1.2 DESCRIPTION OF WORK

- A. Supply and return air grille.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 23 05 00, GENERAL MECHANICAL PROVISIONS.
- B. Section 23 33 00, DUCTWORK AND ACCESSORIES.
- C. Section 23 05 93, TESTING, ADJUSTING, AND BALANCING.

1.4 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Air Diffusion Council Test Code:
 - 1. 1062 GRD-84 Certification, Rating, and Test Manual 4th Edition
- C. American Society of Civil Engineers (ASCE):
 - 1. ASCE7-98 Minimum Design Loads for Buildings and Other Structures
- D. American Society for Testing and Materials (ASTM):
 - 1. A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - 2. A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy coated (Galvannealed) by the Hot-Dip Process.
 - 3. A1011 - Standard Specification for Steel Sheet and Strip Hot rolled Carbon structural, High-Strength Low-Alloy and High Strength Low-Alloy with Improved Formability.
 - 4. B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 5. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
- E. National Fire Protection Association (NFPA):
 - 1. 90A-99 Standard for the Installation of Air Conditioning and Ventilating Systems.
 - 2. 96-01 Ventilation Control and Fire Protection of Commercial Cooking Operations.
- F. Underwriters Laboratories, Inc. (UL):
 - 1. 33-93 UL Standard for Safety Heat Responsive Links for Fire Protection Service

1.5 SUBMITTALS

- A. Submit in accordance with Section 01 33 00, SUBMITTALS.
- B. Manufacturer's Literature and Data:
 - 1. Diffusers, registers, grilles and accessories.
- C. Coordination Drawings: Refer to article, SUBMITTALS, in Section 23 05 00.

1.6 QUALITY ASSURANCE

- A. Refer to article, QUALITY ASSURANCE, in Section 23 05 00.
- B. Fire Safety Code: Comply with NFPA 90A.

PART 2 - PRODUCTS

2.1 AIR OUTLETS AND INLETS

- A. Materials:
 - 1. Aluminum. Provide manufacturer's standard gasket.
 - 2. Exposed Fastenings: The same material as the respective inlet.
 - 3. Contractor shall review all ceiling and wall drawings and details and provide all ceiling and wall mounted devices with appropriate dimensions and trim for the specific locations.
- B. Performance Test Data: In accordance with Air Diffusion Council Code 1062GRD.
- C. Air Supply Outlets:
 - 1. Ceiling Diffusers: Temperature control diffuser suitable for surface mounting and lay-in ceiling mount, off-white finish, and square connection as shown on the drawings. Provide plaster frame for units in plaster ceilings.
 - a. Face type: Square, 4-way directional pattern.
 - b. Control: Wired digital wall adjuster.
 - 2. Wall Grille: Reversible core, Narrow blade grilles with option of a 15 degree or 5 degree blade deflection.
 - a. Flush mount
 - b. Finish: #26 White
 - c. Supply and return
- D. Return or Exhaust Diffuser: Provide opposed blade damper without removable key operator for diffuser.
 - 1. Finish: Off-white baked enamel for ceiling mounted units.
 - 2. Perforated Face Type.
 - 3. Lay-in ceiling
- E. Exhaust Register: Aluminum border and grid with 1/2"x1/2"x1/2" core size.
 - 1. Finish:
 - 2. Egg Crate face type.
 - 3. Flush mount.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with provisions of Section 23 05 00, particularly regarding coordination with other trades and work in existing buildings.
- B. Protection and Cleaning: Adequately protect equipment and materials against physical damage. Place equipment in first class operating condition or return to source of supply for repair or replacement. Protect equipment during construction against entry of foreign matter to the inside and clean both inside and outside before operation and painting.

3.2 CUTTING, PATCHING AND DAMAGE

- A. All necessary cutting and patching of walls, partitions, ceilings, etc., as required for the proper installation of work under this section shall be done under this section. No cutting of structural members will be permitted without the written permission of the Architect.
- B. Any existing work or equipment damaged during the progress of construction or testing shall be replaced with like material, free of charge to the School District or other trades.

3.3 DISCREPANCIES

- A. In the event of discrepancy, immediately notify the Architect.
- B. Do not proceed with the installation in areas of discrepancies until all such discrepancies have been fully resolved.

3.4 AIR OUTLETS

- A. Install inclined blade return and exhaust grilles and registers so that blades obstruct vision by inclining blades as follows:
 - 1. Wall Outlets near Ceiling: Incline toward ceiling.

3.5 AIR BALANCING

- A. Refer to Section 23 05 93.

END OF SECTION

06/08/18

SECTION 23 74 33

PACKAGED AIR CONDITIONING UNIT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. Consult all other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete, finished and workman-like installation. Work under this section includes all labor, equipment, material, services, transportation, etc. required for any reasonably incidental to the complete and satisfactory installation of all of the HVAC Systems as indicated on the Drawings or specified herein.
 - 1. Package Gas/Electric Rooftop Air Conditioning units.
 - 2. Vibration Isolation.
 - 3. Test and Balance.
 - 4. Submittals and Shop Drawings.
 - 5. Record Drawings.
 - 6. Operation and Maintenance Manuals.
 - 7. Vibration isolation, supports and hangers.
 - 8. Seismic restraining devices.
 - 9. Caulking.
 - 10. Guarantee.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 23 05 00, GENERAL MECHANICAL PROVISIONS
- B. Section 23 07 00, MECHANICAL INSULATION
- C. Section 23 33 00, DUCTWORK AND ACCESSORIES
- D. Section 23 09 00, CONTROLS AND INSTRUMENTATION
- E. Section 23 05 93, TESTING, ADJUSTING, AND BALANCING

1.4 WORK DONE BY OTHER DIVISIONS OR SECTIONS

- A. The following work, which is sometimes included in the Air Conditioning Section, will in this case be furnished under other Divisions or Sections. Installation will be by other Divisions or Sections unless specifically noted to be performed by this Section.
 - 1. Finish painting of air conditioning installation unless specifically mentioned or shown.
 - 2. Door louvers and exterior wall louvers.
 - 3. Electrical.

1.5 GENERAL REQUIREMENTS

- A. This section of the specification shall be considered as a part of the entire specification and all applicable portions of General Conditions, Special Conditions, and Division 1 shall apply.
- B. Erection: The Contractor shall furnish the services of an experienced superintendent, who shall be constantly in charge of the erection of the work, together with all necessary journeymen, helpers, and laborers required to properly unload, erect, connect, adjust, start of operate and test the work involved.

1.6 REFERENCES

- A. AABC - National Standards for Field Measurement and Instrumentation, Total System Balance.
- B. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
- C. AMCA 300 - Test code for sound rating air-moving devices.
- D. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilation System.
- E. ARI 270 - Sound rating of Outdoor Unitary Equipment.
- F. ASHRAE 52-76 - Method of Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter.
- G. SMACNA - Low Pressure Duct Construction Standards.
- H. California Mechanical Code - 2016 Edition.

1.7 SUBMITTALS AND SHOP DRAWINGS

- A. Contractor agrees that shop drawings submittals processed by the District do not become Contract Documents and are not Change Orders; that the purpose of the shop drawing review is to establish a reporting procedure and is intended for the Contractor's convenience in organizing his work and to permit the District to monitor the Contractor's progress and understanding of the design. The process of review of the Contractor's submittals is not of testing the District's perception. If deviations, discrepancies or conflicts between shop drawings submittals and the Contract Documents are discovered either prior to or after the shop drawing submittals is processed by the District, the Contractor agrees that the Contract Documents shall control and shall be followed.
- B. Materials and Equipment: As soon as possible and within 35 days after award of the contract, and before their purchase, the Contractor shall submit to the District seven bound booklets for approval containing a complete list of materials, specialties and equipment he is to furnish for the installation. Literature shall be standard manufacturer's catalog cuts and items to be installed shall be clearly indicated. All submittals shall be made at one time.
- C. Each item shall be identified by manufacturer, brand and trade name, number, size, rating and whatever other data is necessary to properly identify and check the materials and equipment. The words: "as specified" will not be considered sufficient identification.
- D. Accessories, controls, finish, etc., not submitted or identified with the submitted equipment shall be furnished and installed as specified.
- E. Shop drawings shall be approved only to extent of information indicated. Approval of an item of equipment shall not be construed to mean approval for components for that item for which Contractor has provided no information.

- F. Approval of shop drawings shall not relieve Contractor of responsibility for providing all controls, wiring, components, etc. which are shown or specified, or all additional controls, wiring, components, etc. required to provide complete and correctly operating mechanical systems.
- G. Submit product data for the following manufactured products, assemblies, personnel and testing agencies required for this project.
 - 1. Packaged Gas/ Electric Air Conditioning units.
 - 2. Controls.
 - 3. Detailed procedures, agenda, sample report forms, and copy of AABC National Project Performance Guarantee.

1.8 SUBSTITUTIONS

- A. Should the Contractor desire to substitute any material, equipment or other items for those specified, he shall submit a complete list, including detailed equipment layouts and performance characteristics within 35 calendar days after the scheduled Start of Construction. Said data shall be submitted in 7 copies, assembled in individual brochures.
- B. The entire cost of all changes of any type due to substitution for materials specified shall be born by the Contractor at no extra cost to the District.
- C. Unsolicited and voluntary deducts, on the part of the Contractor for substituting unapproved systems and/or equipment, shall not be considered for the purpose of awarding the Contract.
- D. The contractor shall submit the amount of cost credit to the Contract in the event the proposed substitution is accepted.
- E. In all cases where substitutions are proposed after bids are received, the Contractor shall bear the cost of evaluation on the basis of 2-1/2 times technical salaries of engineering personnel involved.

1.9 AVAILABILITY OF SPECIFIED EQUIPMENT

- A. Verify prior to bidding that all specified equipment is available and can be obtained in time for installation during orderly and timely progress of the work.
- B. In the event that specified items will not be so available, notify the District prior to receipt of bids
- C. Costs of delays because of non-availability of specified items, when such delays could have been avoided by proper investigation on the part of the Contractor, will be back-charged as necessary and shall not be born by the District.

1.10 RECORD DRAWINGS

- A. The contractor shall arrange and pay for one set of white prints of the HVAC drawings, which he shall alter in red to show all changes made to the original layout. These drawings shall be kept current.
- B. The contractor shall deliver these completed to the District when the job is finished and accepted prior to final payment.

1.11 OPERATION AND MAINTENANCE DATA

- A. Submit two sets prior to final inspection, bound in 8-1/2 x 11 inch text pages, binders with durable plastic covers. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", and title of project. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- B. Contents: Prepare a Table of Contents with each Product or system description identified.
 - 1. Part 1: Directory listing names, addresses, and telephone numbers of District, Contractor, Sub-contractors, and major equipment suppliers.
 - 2. Part 2: Operation and maintenance instructions, arranged by system. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
- C. Submit one copy of completed volumes in final form 15 days prior to final inspection. This copy will be returned after final inspection, with District comments. Revise content of documents as required prior to final submittal.
- D. Submit final volumes (revised) within ten days after final inspection.

1.12 LOCAL CONDITIONS

- A. The Contractor and trade submitting tenders on this work shall visit and will be deemed to have visited the site to ensure that they are familiar with all conditions relating to the work. Failure to visit the site will in no way relieve the successful Contractor of the necessity of furnishing any material or performing any work that may be required to complete the work in accordance with the drawings and specifications without additional cost to the District.

1.13 RULES, REGULATIONS AND CODES

- A. All work and materials shall be in full accordance with the latest California Mechanical Code, California Plumbing Code, California Building Code and local rules and regulations, State Fire Marshal regulations, the safety orders of the Division of Industrial Safety; the National Electrical Code; the standards of the National Fire Protection Association; American Gas Association; Occupation and Safety Act; American National Standards Institute; American Society of Mechanical Engineers; American Society for Testing and Materials; Installation Standards published by the International Association of Plumbing And Mechanical officials (IAPMO) and other applicable laws, codes, or regulations. Nothing in these specifications shall be construed to permit work not conforming to these codes.
- B. Electrical Work: Motors, electrical apparatus and wiring specified in this section shall conform to the National Electrical Manufacturer's Standards and the National Electric Code and bear the Underwriter's label of approval.
- C. The Contractor shall furnish, without extra charge, any additional material and labor when and where required to comply with these rules and regulations, though the work be not mentioned in these Specifications or shown on the Drawings. When these Specifications or Drawings call for or describe materials or construction of a better quality or larger sizes than required by the above mentioned rules and regulations, the provisions of these specifications and accompanying drawings shall take precedence.

1.14 FEES AND PERMITS

- A. The Contractor must obtain and pay all fees for permits, licenses, inspections, etc., which are required by any legally constituted authority. Coordinate exact requirements with the District prior to bid.

1.15 COORDINATION

- A. Following the general arrangement indicated on the Drawings as closely as possible, the Contractor shall coordinate with the architectural, structural, plumbing, electrical and all other trades prior to installation of the materials and equipment to verify adequate space available for installation of the work shown. The District shall be immediately notified if an area of conflict occurs between trades.
- B. The Contractor shall bear all costs incurred for work that must be relocated due to conflicts between trades.
- C. The Mechanical Contractor shall coordinate all requirements for all points of connection with the General Contractor and other trades prior to bid.

1.16 DRAWINGS

- A. The work shall be installed as indicated on Drawings, however, changes to accommodate installation of this work with other work, or in order to meet Architectural or structural conditions, shall be made without additional cost to the District.
- B. For the purpose of clarity and legibility, the Drawings are essentially diagrammatic to the extent that many offsets, bends, unions, special fittings and exact locations are not indicated. The Contractor shall make use of all data in all of the Contract Documents, and shall verify this information at the site.

1.17 INSPECTION

- A. The Contractor shall not allow or cause any of his work to be covered up or closed in until it has been inspected, tested, approved by all authorities have jurisdiction, and until Project Record drawings have been properly annotated.
- B. Should any of his work be covered up or closed in before such inspection, he shall, at his own expense, uncover the work to the satisfaction of the inspection party. All related repair work cost shall be borne by the Contractor.

1.18 DELIVERY, STORAGE AND PROTECTION OF PROPERTY

- A. Place orders for all equipment in time to prevent any delay in construction schedule or completion of project. If any materials or equipment are not ordered in time, additional charges made by equipment manufacturers to complete their equipment in time to meet construction schedule, together with any special handling charges, shall be borne by the contractor.
- B. Materials shall be delivered in ample quantities from time to time as may be necessary for the uninterrupted progress of the work. They shall be stored as to cause the least obstruction to the premises and distributed so as to prevent overloading to any portion of the structure.

- C. The Contractor shall provide temporary storage and shop areas that are required at the site for the safe and proper storage of materials, tools, and other items used in the performance of this work. These areas shall be constructed only in approved locations and shall not interfere with the work of any other Contractor.
- D. All work, equipment and materials shall be protected at all times. The Contractor shall make good all damage caused either directly or indirectly by his own workmen. The Contractor shall also protect his own work from damage. He shall close all pipe and duct openings with caps or plugs during installation. He shall protect all of his equipment and materials against dirt, water, chemical, and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.

1.19 DAMAGE BY LEAKS

- A. Refer to Section 23 05 00.

1.20 ACCESS TO EQUIPMENT FOR MAINTENANCE

- A. Install all equipment, piping, etc. to permit access for normal maintenance. Maintain easy access to filters, motors, etc. Install all such equipment and accessories to facilitate maintenance. Perform any relocation of pipes, etc. required to permit access at request of District at no additional cost to District.
- B. Furnish and install access doors or panels in walls, floors, and ceilings to permit access to equipment, dampers, and all other items requiring service. Coordinate location of access doors with other trades as required.
- C. Size access panels to allow inspection and removal of all items served.
- D. Refer to Section 23 0500.

1.21 GUARANTEES

- A. The Contractor, in accepting this contract, binds himself to replace or repair at his own expense any defect in workmanship or material which may appear within a period of two (2) years from the date of the final acceptance of the building, and to pay for all resulting damage which shall appear within the said period; provided always that the Contractor shall not be liable for anything attributable to acts of the agents of the District, or for ordinary wear. Also, given date of work performed by the Contractor be accepted as complete, he shall agree to correct any deficiencies or omissions in respect to the plans or specifications which may appear in the afore-mentioned twenty-four month period.
- B. The Contractor guarantees that all piping as provided in this specification will be free from all obstructions, and that all piping will be tight and drip free.
- C. All refrigerant compressors shall carry a five-year manufacturer's warranty.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials and equipment shall be new and of the best of their respective grades, free from all defects and of the make, brand or quality herein specified or as accepted by the District.
- B. All materials and equipment shall be identified by manufacturer's name or nameplate data. Unidentified material or equipment shall be removed from the site.
- C. Equipment specified by manufacturer's number shall include all accessories, controls, etc., listed in the catalog as standard with the equipment. Optional or additional accessories shall be furnished as specified.
- D. Where no specific make of material or equipment is mentioned, any first class product of a reputable manufacturer may be used, provided it conforms to the requirements of the system and meets with the approval of the District.
- E. Equipment and materials damaged during transportation, installation and operation shall be considered as "totally damaged" and shall be replaced with new. Any variance from this clause shall be made only with written approval of the District.

2.2 PACKAGE ROOFTOP GAS/ELECTRIC AIR CONDITIONING UNITS- TRANE YHC

- A. General Unit Description:
 - 1. Packaged rooftop units cooling, heating capacities, and efficiencies are AHRI Certified within scope of AHRI Standard 210-240 for 3 to 5 ton units or 340-360 (I-P) or 6 to 10 ton units and ANSI Z21.47 and 10 CFR Part 431 pertaining to Commercial Warm Air Furnaces (all gas heating units)
 - 2. Convertible airflow
 - 3. Microprocessor controls operating range between 115°F and 0°F in cooling mode standard from the factory
 - 4. Electromechanical controls operating range between 115°F and 40°F
 - 5. Factory assembled, internally wired, fully charged with R-410A, and 100 percent run tested to check cooling operation, fan and blower rotation, and control sequence before leaving the factory
 - 6. Colored and numbered wiring internal to the unit for simplified identification
 - 7. Units cULus listed and labeled, classified in accordance for Central Cooling Air Conditioners
- B. Casing:
 - 1. Zinc coated, heavy gauge, galvanized steel
 - 2. Weather-resistant baked enamel finish on phosphatized exterior surfaces
 - 3. Meets ASTM B117, 672 hour salt spray test
 - 4. Removable single side maintenance access panels
 - 5. Lifting handles in maintenance access panels (can be removed and reinstalled by removing two fasteners while providing a water and air tight seal)
 - 6. Exposed vertical panels and top covers in the indoor air section insulated with a cleanable foil-faced, fire-retardant permanent, odorless glass fiber material
 - 7. Base pan shall have no penetrations within the perimeter of the curb other than the raised 1 1/8 inch high downflow supply/return openings to provide an added water integrity precaution, if the condensate drain backs up.
 - 8. Base of the unit insulated with 1/8 inch, foil-faced, captured and sealed, closed-cell insulation
 - 9. Unit base provisions for forklift and/or crane lifting on three sides of unit
- C. Coils:
 - 1. Evaporator and Condenser:
 - a. Internally finned, 5/16" copper tubes mechanically bonded to a configured aluminum plate fin
 - b. Evaporator coils standard for all 3 to 10 ton standard efficiency models

- c. Coils leak tested to 600 psig
 - d. Assembled unit leak tested to 465 psig
 - e. Condenser coil—patent pending 1+1+1 hybrid coil designed with slight gaps for ease of cleaning
 - f. Standard plastic, dual-sloped, removable and reversible condensate drain pan with through-the-base condensate drain
2. Microchannel Condenser:
- a. Standard for 3 to 10 ton standard efficiency models and 4,5,6, 7.5, 8.5 ton high efficiency models
 - b. Not offered on the 4 and 5 ton dehumidification models
 - c. Optimal heat transfer performance due to flat, streamlined tubes with small ports, and metallurgical tube-to-fin bond
 - d. Reduce system refrigerant charge by up to 50% leading to better compressor reliability
 - e. Compact all-aluminum microchannel coils reduce the unit weight
 - f. Recyclable all aluminum coils All aluminium construction minimizes galvanic corrosion
 - g. Strong aluminum brazed structure provides better fin protection RT-PRC023AN-EN 213
 - h. Flat streamlined tubes more dust resistant and easy to clean
 - i. Coils leak tested at the factory to ensure the pressure integrity
- D. Compressors:
- 1. All units have direct-drive, hermetic, scroll type compressors with centrifugal type oil pumps
 - 2. Suction gas-cooled motor with voltage utilization range of plus or minus 10 percent of unit nameplate voltage
 - 3. Internal overloads standard with scroll compressors
 - 4. Crankcase heaters optional on 3 to 10 ton standard efficiency units and standard on 3 to 10 ton high efficiency units
 - 5. Dual compressors recommended for humidity control, light load cooling conditions and system back-up applications
 - 6. Three stages of cooling available on 6 to 10 ton high efficiency units with dual compressors
- E. Controls:
- 1. Units factory-wired with necessary controls and contactor pressure lugs or terminal block for power wiring
 - 2. External location available for mounting a fused disconnect device
 - 3. Choice of electromechanical or microprocessor controls
- F. Electromechanical:
- 1. 24-volt control circuit shall include control transformer and contactor pressure lugs for power wiring
 - 2. Units shall have single point power entry as standard
- G. Microprocessor:
- 1. 24V control functions
 - 2. Resident control algorithms shall make all heating, cooling, and/or ventilating decisions in response to electronic signals from sensors measuring indoor and outdoor temperatures
 - 3. Control algorithm maintains accurate temperature control, minimizes drift from set point, and provides better building comfort
 - 4. Anti-short cycle timing and time delay between compressors provide a higher level of machine protection
- H. Filters:
- 1. 2-inch MERV 8 filters

- I. Gas Heating Section:
 - 1. Progressive tubular heat exchanger, stainless steel burners and corrosion resistant steel
 - 2. Induced draft combustion blower shall be used to pull the combustion products through the firing tubes
 - 3. Heater shall use a direct spark ignition (DSI) system
 - 4. On initial call for heat, the combustion blower shall purge the heat exchanger for 20 seconds before ignition
 - 5. After three unsuccessful ignition attempts, entire heating system shall be locked out until manually reset at the thermostat/zone sensor
 - 6. Units shall be suitable for use with natural gas or propane (field-installed kit)
 - 7. Comply with the California requirement for low NOx emissions (gas/electric only)
- J. Indoor Fan:
 - 1. Direct drive plenum fan design – 10 tons, 6 ton (074), 7.5 to 8.5 ton high efficiency units
 - 2. Plenum fan design— backward-curved fan wheel along with an external rotor direct drive variable speed indoor motor
 - 3. Plenum fan design— variable speed adjustment potentiometer located in the control box
 - 4. Belt drive units – 3 to 5 ton units (high efficiency 3-phase with optional motor) and 6 to 8.5 tons, standard efficiency
 - 5. Multispeed, direct drive motors— FC centrifugal fans with adjustable motor sheaves. 3 to 5 ton units (standard and high efficiency)
 - 6. Motors thermally protected.
 - 7. Variable speed direct drive motors— 10 tons, 6 ton (074), 7.5 to 8.5 (high efficiency)
 - 8. Indoor fan motors meet the U.S. Energy Policy Act of 1992 (EPACT)
- K. Outdoor Fan:
 - 1. Direct-drive, statically balanced, draw-through in the vertical discharge position
 - 2. Permanently lubricated, built-in thermal overload protection included
- L. Phase Monitoring Protection:
 - 1. 3-phase power equipped with phase monitoring protection as standard
 - 2. Protect motors and compressors against problems caused by phase loss, phase imbalance and phase reversal indication
- M. Refrigerant Circuits:
 - 1. Thermal expansion valve standard
 - 2. Service pressure ports, and refrigerant line filter driers factory-installed standard
 - 3. Area provided for replacement suction line driers
- N. Unit Top:
 - 1. One-piece construction or where seams exist, it shall be outside the indoor air-conditioned section.
 - 2. Ribbed top adds extra strength and prevents water from pooling
- O. Factory Installed Options:
 - 1. CompleteCoat™ Coils
 - a. Cathodic epoxy type electro-disposition coating formulated for high edge build to plate fin and tube heat exchangers
 - b. Coating provides excellent resistance and durability to corrosive effects of alkalies, acids, alcohols, petroleum, seawater, salt air and corrosive environments
 - c. Option is available for the plate fin-tube condenser coil and the microchannel type condenser coil
 - 2. Condensate Overflow Switch:

- a. If a clogged condensate drain line is preventing proper condensate removal from the unit this option will shut the unit down
- 3. Heat Exchanger:
 - a. Compact cabinet features a tubular heat exchanger in low, medium and high heat capacities
 - b. Stainless steel burners and corrosion-resistant aluminized steel tubes standard on all models
 - c. Induced draft blower to pull the gas mixture through the burner tubes
 - d. Direct spark ignition system doubles as a safety device to validate the flame
 - e. Gas/electric Precedent™ models exceed all California seasonal efficiency requirements and perform better than required to meet the California NOx emission requirements
- 4. Hinged Access Doors:
 - a. Sheet metal hinges available on the filter/evaporator, supply fan/heat, and the compressor/ control access doors
- 5. Powered or Unpowered Convenience Outlet:
 - a. Powered or unpowered GFCI, 120V/15amp, 2 plug, convenience outlet
 - b. When convenience outlet is powered, a service receptacle disconnect will be available
 - c. Convenience outlet is powered from the line side of the disconnect or circuit breaker, and therefore will not be affected by the position of the disconnect or circuit breaker
 - d. Available to order when through-the-base electrical with disconnect switch or circuit breaker option is ordered
- 6. Multi-Speed Indoor Fan System:
 - a. Automatically switch operation of the indoor fan between high speed and low speed, based on the number of compressors operating
 - b. Operate at high speed whenever the gas or electric heater is operating
- 7. Supply, Return and Plenum Air Smoke Detector:
 - a. All unit operation will shut down if smoke is detected
 - b. Reset manual at unit
 - c. In order for supply or return air smoke detector to properly sense smoke in the supply/return air stream, entering air velocity must be between 500 - 4000 feet per minute
 - d. Equipment covered in this manual will develop an airflow velocity that falls within these limits over the entire airflow range specified in the evaporator fan performance table
 - e. Supply and/or return smoke detectors may not be used with plenum smoke detector
- 8. Through-the-Base Electrical Access
 - a. Electrical access for control and main power connections inside the curb and through-the-base of the unit
 - b. Field installation of liquid-tight conduit
 - c. External field-installed disconnect switch
- P. Factory or Field Installed Options:
 - 1. Economizer (Standard):
 - a. Available with or without barometric relief.
 - b. Fully modulating 0-100 percent motor and dampers, minimum position setting, preset linkage, wiring harness with plug, spring return actuator and fixed dry bulb control
 - c. Barometric relief shall provide a pressure operated damper that shall be gravity closing
 - d. Barometric relief shall prohibit entrance of outside air during the equipment "off" cycle
 - e. Arrives in shipping position and shall be moved to the operating position by the installing contractor
 - 2. Low Leak Economizer:

- a. Meets low leak requirements for ASHRAE 90.1, IECC, and CA Title 24 standards (3 cfm/ ft²@1" wg exterior air, 4 cfm/ft²@1" wg return air)
- b. 100% outdoor air supply from 0-100% modulating dampers
- c. Standard with barometric relief
- d. Can be paired with powered exhaust for additional building pressure relief
- e. Can be paired with or without Fault Detection & Diagnostics (FDD) to meet current mandatory CA Title 24 requirements
- f. Available on downflow units only

Q. Field Installed Options:

- 1. Powered Exhaust:
 - a. Available for 3 to 10 ton units
 - b. Shall provide exhaust of return air, when using an economizer
 - c. Maintain better building pressurization
- 2. Roof Curb:
 - a. Designed to mate with the unit's downflow supply and return
 - b. Provide support and a water tight installation when installed properly
 - c. Shall allow field-fabricated rectangular supply/return ductwork to be connected directly to the curb
 - d. Curb shall be shipped knocked down for field assembly
 - e. Shall include wood nailer strips

2.3 SCREENS

- A. Provide removable bird screens on all outside air intakes and exhaust air discharges to outside air. Screen shall be secured in frames of same materials as duct, hood or equivalent to which attached.
- B. Screens for louvers provided under other Divisions of the specifications are not included under this section.

2.4 CONTROLS

- A. See Requirements in Section 23 09 00 for Controls.
- B. The Mechanical Contractor shall be responsible for the proper coordination of all control work and electrical work in connection therewith. Contractor shall also be responsible for the proper operation of the entire system.
- C. The Electrical Contractor shall furnish and install all line voltage control wiring, and all conduit. Wire sizing and length of run shall be coordinated with the manufacturer and Electrical Engineer. All EMS controls, wiring, and conduit shall be by EMS contractor.
- D. Electrical Work: All electric relays, hand-off automatic switches and all electrical wiring and all conduit will be provided under the Electrical Section, except as otherwise specified. Furnish and install additional conduit, wiring, relays, and hand-off-automatic switches made necessary by the use of approved substituted equipment under this Section with no additional cost to the Owner.
- E. Refer to drawings for control diagrams and additional requirements.
- F. Calibration of Controls: The EMS Contractor shall carefully calibrate and adjust all controls as required to maintain comfort conditions and maximum energy conservation.
- G. EMS Thermostats shall be by the EMS contractor and shall part of an energy management system unless specified otherwise.

- H. Where stand-alone controls are indicated, mechanical contractor shall be responsible for low voltage controls conduit, wiring, and thermostat.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install all equipment in locations indicated on the Drawings. Contractor will be responsible to verify with the District, if suitability is doubted. Contractor shall notify the District before installation into any apparent improper locations of interference with other work such as electrical outlets, windows, cabinetwork or other features.

3.2 INSPECTION

- A. Roof-top equipment: Install in accordance with manufacturer's instructions. Mount units on factory built roof-mounting frame providing watertight enclosure to protect ductwork and utility services, or on platforms. Install roof mounting frame level.
- B. All equipment shall be installed meeting strict conformance with manufacturer's recommendations. All equipment shall be installed level and plumb. Fan and motors shall be anchored-bolted to a concrete pad or suspended or wall mounted as shown on Contract Drawings. Only cast in place anchors shall be used for fan installation. Fans will be grounded as recommended by the manufacturer.
- C. Verify that the mechanical system may be installed in complete accordance with all pertinent codes and regulations and the approved shop drawings.

3.3 INSTALLATION OF EQUIPMENT

- A. Install all equipment in the locations indicated on the approved shop drawings.
- B. Avoid interference with structure and with work of other trades, preserving adequate headroom and clearing all doors and passageways.
- C. Check each piece of equipment in the system for defects, verifying that all parts are properly furnished and installed, that all items function properly and that all adjustments have been made.
- D. All mechanical equipment (fans, ductwork, piping, etc.) shall be isolated from the building structure by means of noise and vibration isolators. No rigid contact shall be allowed between pipes or ducts and building structures or support frames.
- E. The gaps between penetrating elements, ductwork, piping and the walls of the holes shall be filled on all sides with resilient material and sealed air tight on each wall with non-hardening sealant. Provide sheet metal and collar at all exposed ductwork penetrations. Duct collar shall cover the annular space around the duct with a minimum 1" overlap.
- F. Fabricate, with steel, special mounting brackets as required to clear other equipment, doors and to span for best structural support of mechanical.
- G. All duct connections to mechanical equipment shall be made with flexible connectors.
- H. Install equipment so that nameplates are easily visible.

- I. Where not otherwise indicated, equipment and material installation is published manufacturer's recommendations. This requirement includes details, clearances and accessories.

3.4 CUTTING, PATCHING AND DAMAGE

- A. All necessary cutting and patching of walls, floors, partitions, ceilings, etc., as required for the proper installation of work under this section shall be done under this section. No cutting of structural members will be permitted without the written permission of the Architect.
- B. Any existing work or equipment damaged during the progress of construction or testing shall be replaced with like material, free of charge to the School District or other trades.

3.5 DISCREPANCIES

- A. In the event of discrepancy, immediately notify the Architect.
- B. Do not proceed with the installation in areas of discrepancies until all such discrepancies have been fully resolved.

3.6 FILTERS

- A. Do not operate air supply system unless filters are installed, including temporary pre-filters for use during construction. If not used, deliver the spare set to the Owner at the time of acceptance.
- B. Install new filters at final inspection concurrently with turn over to Owner.

3.7 AIR BALANCING

- A. Refer to Section 23 05 93.

3.8 SOUND AND VIBRATION ISOLATION

- A. All vibrating equipment shall be sound isolated from the structure.
- B. The Contractor shall submit all necessary data for each vibration isolator, including static deflection and weight loading, for equipment in operation.
- C. All vibrating equipment shall be provided with flexible pipe connections. Submit for approval prior to installation.

3.9 CLEANING

- A. Completely cover motor and other moving machinery to protect from dirt and water during construction. Cap all openings into ducts and pipes to protect from foreign matter while under construction.
- B. During the process of work, premises shall be kept reasonably free of all debris, cuttings and waste material resulting from work under this heading. All debris, rubbish, leftover material tools and equipment shall be removed from the site prior to final acceptance.

- C. Thoroughly clean all parts of apparatus and equipment. Exposed parts which will be painted shall be thoroughly cleaned of cement, plaster and other materials. All grease or oil spots shall be removed with carbon tetrachloride. Such surfaces shall be carefully brushed down with a wire brush to remove rust and other spots and left smooth and clean.
- D. Damaged factory applied finished shall be "touched up". "Touched up" shall be accomplished with preparation, prime and finish coats applied in strict accordance with manufactures recommendations.

3.10 EQUIPMENT IDENTIFICATION AND OPERATION INSTRUCTIONS

- A. Furnish the Owner with a hard bound brochure titled "Mechanical System" which shall contain the following information typed, indexed, tabbed and bound inside:
 - 1. An alphabetical list of all equipment excepting pipe and fittings: the manufacture; the catalog number; and the local distributing agent, including his address and telephone number.
 - 2. Manufacturer's instructions for all items requiring maintenance. This shall include, but not be limited to, all motor driven equipment, controls, pressure regulating devices, packaged equipment, etc. Where manufacturer's directions are not clear, are incomplete or do not exist, develop information necessary to service, clean, adjust, etc., all items. Delete all information in manufacturer's literature, which is not applicable. Identify all equipment in the manual. List the time intervals that all maintenance tasks should be performed.
 - 3. Submit three (3) copies of the brochure to the Architect for approval and furnish the Owner with at least two (2) corrected brochures.
 - 4. Provide for and fasten to each piece of equipment a permanent name plate fabricated of engraved laminated plastic, white between black laminations, indicating the identifying mark and the area or spaces served by the equipment.

END OF SECTION

06/08/18

SECTION 26 05 00

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Electrical identification.
 - 2. Utility company electricity-metering components.
 - 3. Concrete equipment bases.
 - 4. Electrical demolition.
 - 5. Cutting and patching for electrical construction.
- B. Refer to drawings for applicable codes.

1.2 SUBMITTALS

- A. Product Data: For utility company electricity-metering components.
- B. Shop Drawings: Dimensioned plans and sections or elevation layouts and single-line diagram of electricity-metering component assemblies specific to this Project.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Devices for Utility Company Electricity Metering: Comply with utility company published standards.
- C. Comply with NFPA 70.

1.4 COORDINATION

- A. Coordinate chases, slots, inserts, sleeves, and openings for electrical supports, raceways, and cable with general construction work.
- B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment that requires positioning before closing in the building.
- C. Coordinate electrical service connections to components furnished by utility companies.
 - 1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for service entrances and electricity-metering components.
- D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces.

- E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

PART 2 - PRODUCTS

2.1 SUPPORTING DEVICES

- A. Material: Cold-formed steel, with corrosion-resistant coating.
- B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.
- C. Slotted-Steel Channel: Flange edges turned toward web, and 9/16-inch- diameter slotted holes at a maximum of 2 inches o.c., in webs. Strength rating to suit structural loading.
- D. Slotted Channel Fittings and Accessories: Recommended by the manufacturer for use with the type and size of channel with which used.
 - 1. Materials: Same as channels and angles, except metal items may be stainless steel.
- E. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
- F. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
- G. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.
- H. Expansion Anchors: Carbon-steel wedge or sleeve type.
- I. Toggle Bolts: All-steel springhead type.
- J. Powder-Driven Threaded Studs: Heat-treated steel.

2.2 ELECTRICAL IDENTIFICATION

- A. Identification Device Colors: Use those prescribed by ANSI A13.1, NFPA 70, and these Specifications.
- B. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape, not less than 1 inch wide by 3 mils thick.
- C. Tape Markers for Conductors: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
- D. Color-Coding Cable Ties: Type 6/6 nylon, self-locking type. Colors to suit coding scheme.
- E. Underground Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape compounded for permanent direct-burial service, and with the following features:
 - 1. Not less than 6 inches wide by 4 mils thick.
 - 2. Embedded continuous metallic strip or core.
 - 3. Printed legend that indicates type of underground line.

- F. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch minimum thickness for signs up to 20 sq. in. and 1/8-inch minimum thickness for larger sizes. Engraved legend in black letters on white background.
- G. Warning and Caution Signs: Preprinted; comply with 29 CFR 1910.145, Chapter XVII. Colors, legend, and size appropriate to each application.
 - 1. Interior Units: Aluminum, baked-enamel-finish, punched or drilled for mechanical fasteners.
 - 2. Exterior Units: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate with 0.0396-inch, galvanized-steel backing. 1/4-inch grommets in corners for mounting.
- H. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

2.3 EQUIPMENT FOR UTILITY COMPANY'S ELECTRICITY METERING

- A. Comply with requirements of electrical power utility company for all new service entrance equipment, raceways and structures.

2.4 CONCRETE BASES

- A. Concrete Forms and Reinforcement Materials: As specified in Division 03 Section "Cast-in-Place Concrete."
- B. Concrete: 3000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom.
- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 ELECTRICAL SUPPORTING DEVICE APPLICATION

- A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, slotted channel system components.
- B. Dry Locations: Steel materials.
- C. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four with, 200-lb minimum design load for each support element.

3.3 SUPPORT INSTALLATION

- A. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
- B. Size supports for multiple raceway or cable runs so capacity can be increased by a 25 percent minimum in the future.
- C. Support individual horizontal single raceways with separate, malleable-iron pipe hangers or clamps except use spring-steel fasteners for 1-1/2-inch and smaller single raceways above suspended ceilings and for fastening raceways to slotted channel and angle supports.
- D. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.
- E. Secure electrical items and their supports to building structure, using the following methods unless other fastening methods are indicated:
 - 1. Wood: Wood screws or screw-type nails.
 - 2. Gypsum Board: Toggle bolts. Seal around sleeves with joint compound, both sides of wall.
 - 3. Masonry: Toggle bolts on hollow block and expansion bolts on solid block. Seal around sleeves with mortar, both sides of wall.
 - 4. New Concrete: Concrete inserts with machine screws and bolts.
 - 5. Existing Concrete: Expansion bolts.
 - 6. Structural Steel: Spring-tension clamps.
 - a. Comply with AWS D1.1 for field welding.
 - 7. Light Steel Framing: Sheet metal screws.
 - 8. Fasteners for Damp, Wet, or Weather-Exposed Locations: Stainless steel.
 - 9. Light Steel: Sheet-metal screws.
 - 10. Fasteners: Select so load applied to each fastener does not exceed 25 percent of its proof-test load.

3.4 IDENTIFICATION MATERIALS AND DEVICES

- A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.
- C. Self-Adhesive Identification Products: Clean surfaces before applying.
- D. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.
- E. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches, overall, use a single line marker.
- F. Install warning, caution, and instruction signs where required to comply with 29 CFR 1910.145, Chapter XVII, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Indoors install engraved plastic-laminated instruction signs with approved legend where instructions are

needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

- G. Install engraved-laminated emergency-operating signs with white letters on red background with minimum 3/8-inch- high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

3.5 ELECTRICITY-METERING EQUIPMENT

- A. Install utility company metering equipment according to utility company's written requirements. Provide grounding and empty conduits as required by utility company.

3.6 FIRESTOPPING

- A. Apply firestopping to cable and raceway sleeves and other penetrations of fire-rated floor and wall assemblies to restore original undisturbed fire-resistance ratings of assemblies. Firestopping installation is specified in Division 7 Section "Penetration Firestopping."

3.7 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger, in both directions, than supported unit. Follow supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated.

3.8 DEMOLITION

- A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.
- B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.
- C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.
- D. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

3.9 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair, refinish and touch up disturbed finish materials and other surfaces to match adjacent undisturbed surfaces.

END OF SECTION

06/08/18

Not Used:

- C. Refer to Division 11 and Division 13 specifications for additional electrical work to be provided.
- D. Refer to TR, TL, AV and FS drawings for additional electrical work to be provided.

SECTION 26 05 13

CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.2 SUBMITTALS

- A. Field quality-control test reports.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 CONDUCTORS AND CABLES

- A. Manufacturers:
 - 1. American Insulated Wire Corp.; a Leviton Company.
 - 2. General Cable Corporation.
 - 3. Senator Wire & Cable Company.
 - 4. Southwire Company.
- B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.
- C. Conductor Material: Copper complying with NEMA WC 5 or 7; solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.
- D. Conductor Insulation Types: Type THW, THHN-THWN or XHHW complying with NEMA WC 5 or 7

2.3 CONNECTORS AND SPLICES

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc.
 - 2. AMP Incorporated/Tyco International.
 - 3. Hubbell/Anderson.
 - 4. O-Z/Gedney; EGS Electrical Group LLC.
 - 5. 3M Company; Electrical Products Division.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

- A. Service Entrance: Type THHN-THWN, single conductors in raceway.
- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspace: Type THHN-THWN, single conductors in raceway.
- E. Exposed Branch Circuits, including in Crawlspace: Type THHN-THWN, single conductors in raceway.
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- G. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THHN-THWN, single conductors in raceway.
- H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord.
- I. Fire Alarm Circuits: Type THHN-THWN, in raceway.
- J. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- K. Class 2 Control Circuits: Type THHN-THWN, in raceway.

3.2 INSTALLATION

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26 Section "Basic Electrical Materials and Methods."
- F. Seal around cables penetrating fire-rated elements according to Division 7 Section "Through-Penetration Firestop Systems."
- G. Identify and color-code conductors and cables according to Division 26 Section "Basic Electrical Materials and Methods."
- H. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- I. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.3 FIELD QUALITY CONTROL

- A. Testing: Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.
- B. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION

06/08/18

SECTION 26 05 33

RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.2 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets indicated.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 METAL CONDUIT AND TUBING

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc.
 - 2. Alflec Inc.
 - 3. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 4. Electri-Flex Co.
 - 5. Grinnell Co./Tyco International; Allied Tube and Conduit Div.
 - 6. LTV Steel Tubular Products Company.
 - 7. Manhattan/CDT/Cole-Flex.
 - 8. O-Z Gedney; Unit of General Signal.

- 9. Wheatland Tube Co.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. IMC: ANSI C80.6.
- D. EMT and Fittings: ANSI C80.3.
 - 1. Fittings: Set-screw or compression type.
- E. FMC: Aluminum.
- F. LFMC: Flexible steel conduit with PVC jacket.
- G. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

2.3 NONMETALLIC CONDUIT AND TUBING

- A. Manufacturers:
 - 1. American International.
 - 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 3. Arnco Corp.
 - 4. Cantex Inc.
 - 5. Certainteed Corp.; Pipe & Plastics Group.
 - 6. Condux International.
 - 7. ElecSYS, Inc.
 - 8. Electri-Flex Co.
 - 9. Lamson & Sessions; Carlon Electrical Products.
 - 10. Manhattan/CDT/Cole-Flex.
 - 11. RACO; Division of Hubbell, Inc.
 - 12. Spiralduct, Inc./AFC Cable Systems, Inc.
 - 13. Thomas & Betts Corporation.
- B. RNC: NEMA TC 2, Schedule 40 and Schedule 80 PVC.
- C. RNC Fittings: NEMA TC 3; match to conduit or tubing type and material.

2.4 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Finish with manufacturer's standard prime coating.
 - 1. Manufacturers:
 - a. Airey-Thompson Sentinel Lighting; Wiremold Company (The).
 - b. Thomas & Betts Corporation.

- c. Walker Systems, Inc.; Wiremold Company (The).
 - d. Wiremold Company (The); Electrical Sales Division.
- B. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC compound with matte texture and manufacturer's standard color.
 - 1. Manufacturers:
 - a. Butler Manufacturing Co.; Walker Division.
 - b. Enduro Composite Systems.
 - c. Hubbell, Inc.; Wiring Device Division.
 - d. Lamson & Sessions; Carlon Electrical Products.
 - e. Panduit Corp.
 - f. Walker Systems, Inc.; Wiremold Company (The).
 - g. Wiremold Company (The); Electrical Sales Division.
- C. Types, sizes, and channels as indicated and required for each application, with fittings that match and mate with raceways.

2.5 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers:
 - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 - 2. Emerson/General Signal; Appleton Electric Company.
 - 3. Erickson Electrical Equipment Co.
 - 4. Hoffman.
 - 5. Hubbell, Inc.; Killark Electric Manufacturing Co.
 - 6. O-Z/Gedney; Unit of General Signal.
 - 7. RACO; Division of Hubbell, Inc.
 - 8. Robroy Industries, Inc.; Enclosure Division.
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.
- D. Nonmetallic Outlet and Device Boxes: NEMA OS 2.
- E. Floor Boxes: Cast metal, fully adjustable, rectangular.
- F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- G. Cast-Metal Pull and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- H. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

- I. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

2.6 FACTORY FINISHES

- A. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard prime-coat finish ready for field painting.

2.7 CABLE TRAY

- A. Cable tray shall be aluminum, rung type, 24"W x 4"H, with rung spacing of 6", per NEMA VE 1 requirements.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors:
 1. Exposed: Rigid steel or IMC.
 2. Concealed: Rigid steel or IMC.
 3. Underground, Single Run: RNC.
 4. Underground, Grouped: RNC.
 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 6. Boxes and Enclosures: NEMA 250, Type 3R.
- B. Indoors:
 1. Exposed: EMT.
 2. Concealed: EMT.
 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except use LFMC in damp or wet locations.
 4. Damp or Wet Locations: Rigid steel conduit.
 5. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
 - a. Damp or Wet Locations: NEMA 250, Type 4, stainless steel.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Conduits used for fiber optic cable installation shall be provided with inner duct.
- E. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.

3.2 INSTALLATION

- A. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- B. Complete raceway installation before starting conductor installation.
- C. Support raceways as specified in Division 26 Section "Basic Electrical Materials and Methods."
- D. Install temporary closures to prevent foreign matter from entering raceways.
- E. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above finished slab.
- F. Provide inner duct in conduit for all fiber optic cable installation.
- G. Provide flexible metal conduits for conduits installed inside cabinets.
- H. Make bends and offsets so ID is not reduced. Keep legs of bends in same plane and keep straight legs of offsets parallel, unless otherwise indicated.
- I. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
 1. Install concealed raceways with a minimum of bends in shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.
- J. Raceways Embedded in Slabs: Install in middle 1/3 of slab thickness where practical and leave at least 2 inches of concrete cover.
 1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
 2. Space raceways laterally to prevent voids in concrete.
 3. Run conduit larger than 1-inch trade size parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 4. Change from nonmetallic tubing to Schedule 80 nonmetallic conduit, rigid steel conduit, or IMC before rising above floor.
- K. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
 1. Run parallel or banked raceways together on common supports.
 2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
- L. Join raceways with fittings designed and approved for that purpose and make joints tight.
 1. Use insulating bushings to protect conductors on all raceways 2" and larger.

- M. Tighten set screws of threadless fittings with suitable tools.
- N. Terminations:
 - 1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
 - 2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.
- O. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- P. Telephone and Signal System Raceways, 2-Inch Trade Size and Smaller: In addition to above requirements, install raceways in maximum lengths of 150 feet and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.
- Q. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
 - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - 2. Where otherwise required by NFPA 70.
- R. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.
- S. Flexible Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.
- T. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.
- U. Set floor boxes level and flush with finished floor surface.
- V. Install hinged-cover enclosures and cabinets plumb. Support at each corner.
- W. Install cable tray in accordance with NEMA VE 2 requirements.

3.3 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION

06/08/18

SECTION 26 09 23

LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Time switches.
 - 2. Photoelectric relays.
 - 3. Occupancy sensors.
 - 4. Multipole lighting relays.
 - 5. Multipole lighting contactors.
 - 6. Basic control contactor panels
 - 7. System clock
 - 8. Exterior photocell

1.2 SUBMITTALS

- A. Product Data: For each type of lighting control device indicated.
- B. Field quality-control test reports.
- C. Operation and maintenance data.
- D. Shop drawings: Submit dimensional drawings of all lighting control system components and accessories.
- E. Typical wiring diagram: Submit typical wiring diagrams for all components including, but not limited to, contactor panels, contactors, photocells, switches, occupancy sensors, and daylighting controls.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with 47 CFR 15, Subparts A and B, for Class A digital devices.
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Contactors and Relays:
 - a. Automatic Switch Co.
 - b. Challenger Electrical Equipment Corp.
 - c. Cutler-Hammer Products; Eaton Corporation.
 - d. Furnas Electric Co.
 - e. GE Lighting Controls.
 - f. Hubbell Lighting, Inc.
 - g. Siemens Energy and Automation, Inc.
 - h. Square D Co.; Power Management Organization.
 - i. Zenith Controls, Inc.
 2. Time Switches:
 - a. Diversified Electronics, Inc.
 - b. Grasslin Controls Corp.
 - c. Intermatic, Inc.
 - d. Leviton Manufacturing.
 - e. Paragon Electric Co., Inc.
 - f. Tork, Inc.
 - g. Zenith Controls, Inc.
 - h. Watt Stopper, Inc. (The).
 3. Photoelectric Relays:
 - a. Allen-Bradley/Rockwell Automation.
 - b. Area Lighting Research, Inc.
 - c. Fisher Pierce.
 - d. Grasslin Controls, Corp.
 - e. Intermatic, Inc.
 - f. Paragon Electric Co., Inc.
 - g. Rhodes, MH, Inc.
 - h. SSAC, Inc.
 - i. Tork, Inc.
 4. Occupancy Sensors:

- a. Watt Stopper, Inc. (The).
 - b. Honeywell, Inc.; Home and Building Controls.
 - c. Hubbell Lighting, Inc.
 - d. Lightolier.
 - e. Lithonia Control Systems.
 - f. MyTech Corporation.
 - g. Novitas, Inc.
 - h. RAB Electric Manufacturing Co., Inc.
5. Basic control contactor panels and associated accessories:
- a. Watt Stopper, Inc. (The).
 - b. Lithonia control systems
 - c. Leviton company Inc.
 - d. GE Industrial Systems; Total Lighting Control.

2.2 GENERAL LIGHTING CONTROL DEVICE REQUIREMENTS

- A. Line-Voltage Surge Protection: Include in all 120- and 277-V solid-state equipment. Comply with UL 1449 and with ANSI C62.41 for Category A locations.

2.3 TIME SWITCHES

- A. Description: Solid-state programmable type with alphanumeric display complying with UL 917.
 - 1. Astronomic dial.
 - 2. Two contacts, rated 30 A at 277-V ac, unless otherwise indicated.
 - 3. Two pilot-duty contacts, rated 2 A at 240-V ac, unless otherwise indicated.
 - 4. Eight-day program uniquely programmable for each weekday and holidays.
 - 5. Skip-day mode.

2.4 PHOTOELECTRIC RELAYS

- A. Outdoor Sealed Units: Solid state, with single-pole, double-throw dry contacts rated to operate connected relay or contactor coils or microprocessor input, and complying with UL 773A Weathertight housing, resistant to high temperatures and equipped with sun-glare shield and ice preventer.
 - 1. Light-Level Monitoring Range: 0 to 3500 fc (0 to 37 673 lx), with an adjustment for turn-on/turn-off levels.
 - 2. Time Delay: Prevents false operation.

2.5 OCCUPANCY SENSORS

- A. Ceiling and Non-Switch-Box Mounting Units: Unit receives control power from a separately mounted auxiliary power and control unit, and operates power switching contacts in that unit in response to signals from sensors.
 - 1. Auxiliary Power and Control Units: Matched to sensors with which used. Features as follows:
 - a. Relays rated for a minimum of 20-A normal ballast load or 13-A tungsten filament or high-inrush ballast load.
 - b. Sensor Power Supply: Rated to supply the number of connected sensors.
- B. Switch-Box-Mounting Units: Unit receives power directly from switch leg of the 120- or 277-V ac circuit it controls and operates integral power switching contacts rated 800 W at 120-V ac, and 1000 W at 277-V ac, minimum.
 - 1. Manual Override Switch: Turns lights on/off manually regardless of elapsed time delay.
- C. Operation: Turns lights on when room or covered area is occupied and off when unoccupied, unless otherwise indicated.
 - 1. Time Delay for Turning Lights Off: Adjustable over a range from 1 to 15 minutes, minimum.
 - 2. Ambient-Light-Level Control: Adjustable for setting a level of ambient illumination above which sensor will not turn lights on when occupancy is sensed.
- D. Passive-Infrared Type: Detects occupancy by a combination of heat and movement in zone of coverage. Each sensor detects occupancy anywhere in an area of 1000 sq. ft. (93 sq. m) by detecting occurrence of 6-inch (150-mm) minimum movement of any portion of a human body that presents a minimum target of 36 sq. in. (232 sq. cm) to the sensor.
- E. Ultrasonic Type: Emits a beam of ultrasonic energy and detects occupancy through use of Doppler's principle in discerning movement in zone of coverage by sensing a change in pattern of reflected ultrasonic energy.
- F. Dual-Technology Type: Uses a combination of passive-infrared and ultrasonic detection methods to distinguish between occupied and unoccupied conditions for area covered. Particular technology or combination of technologies that controls each function (on or off) is selectable in the field by operating controls on unit.
- G. Unless otherwise noted, provide dual-technology type occupancy sensors where shown.

2.6 MULTIPOLE CONTACTORS AND RELAYS

- A. Description: Electrically operated and mechanically held, and complying with UL 508 and NEMA ICS 2.
 - 1. Listed Current Rating for Switching: Consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballasts with 15 percent or less total harmonic distortion of normal load current).
 - 2. Control Coil Voltage: Match control power source.

2.7 BASIC CONTROL CONTACTOR PANELS

A. Description: Shall be UL listed and consist of following:

1. Tub: Empty NEMA 1 enclosure that can accept an interior sized to accept up to 16, 32, or 64 contactor poles.
2. Cover: Surface or Flush as required, with captive screws in a hinged, lockable configuration.
3. Interior: Metal back plate and barrier for separation of high voltage (class 1) and low voltage (class 2) wiring. Intelligence board with eight channels of control provided regardless of interior size. Interiors shall be provided with up to 16, 32, or 64 DIN rail mounted contactor poles.

B. Features:

1. Contactors shall be DIN rail mounted, four pole, normally closed, electrically held with coil voltage to match panel control power voltage. Contactors shall be compatible with all lighting, ballast and HID loads and be rated for 20 Amp tungsten up to 277V and rated for 30 Amp ballast and general use up to 600V. Provide 20% spare contactor poles.
2. Eight automatic control channels for operating contactors controlling exterior and/or interior lighting. Each channel shall be individually configurable to meet project needs. Each channel shall include an LED light status indicator to provide channel status and a separate ON/OFF/Auto switch for manual channel control.
3. Clock port for connection to an optional system clock. When a system clock is installed, eight override inputs are activated providing logic control of the eight channels from external photocells, switches, occupancy sensors, timers, daylighting controllers, etc.
4. Expansion terminals shall be provided for low voltage wiring connection between main and expansion panels in a multiple panel system. All automatic channel operation in the designated main panel (panel with the system clock), shall signal expansion panels' corresponding channels to operate.
5. Auxiliary power for operating optional system devices provides 350mA at 24VDC and 350mA at 24VAC power.

2.8 SYSTEM CLOCK

A. Description:

1. The system time clock shall be installed in the main or central panel of a multiple panel system or in each panel when individual panel time control is desired. The system clock shall provide time-based control with eight year time back-up, non-volatile memory program storage, automatic daylight savings adjustment, selectable 12/24 hour time formats and selectable date formats. All clock programming shall be accessible from the clock front display/keypad.

B. Features:

1. Control of eight control channels shall be available on the clock. Provide status and manual ON/OFF control of each channel from the front display and keypad.
2. The clock shall have control of eight individual override inputs, which can be used to connect external devices such as photocells, switches and daylighting controllers. Each of these inputs can be configured to operate as a photocell, as an ON/Auto switch, as a maintained ON/OFF switch, or as a momentary ON/OFF switch.

3. Schedules shall be assigned to any combination of days of the week and/or 3 holiday day types. Other scheduling features shall include:
 - i) Temporary schedules: schedules that execute on an assigned day then automatically delete themselves from memory.
 - ii) Repeating schedules: repeat a schedule at intervals that are adjustable from 5 minutes to 10 hours.
 4. 32 perpetual holidays assigned to any one of three holiday day schedules and continuing for 1 to 120 days. Holiday dates shall be specific day/month/year, or perpetual dates including day/month/all years or day of the week in a given month every year or self-calculating Easter Sunday.
 5. Astronomic capability for calculating sunrise and sunset based on time, latitude, longitude, and time zones. All scheduled astronomic/time operations shall be interlocked so loads are not turned on when astronomic off times are earlier than scheduled on times or astronomic on times are later than scheduled off times. Each schedule shall have an independent astronomic offset of + 120 minutes.
 6. Following a power outage, the system clock shall run a start-up process that executes schedules that would have been missed during the power outage.
- C. Description:
1. The exterior photocell shall offer a footcandle range of 1-15 and an eight-second time delay. The photocell shall mount on the exterior or roof of a building with its light level window facing the northern sky. The photocell shall provide an ON signal when the ambient light level drops below a user-defined dark setpoint, and an OFF signal when the ambient light level rises above a user-defined light setpoint.
- D. Features:
1. The photocell shall use a set of normally open, isolated relay contacts that are rated for one Amp at 30 VAC/VDC.
 2. The photocell shall have an adjustable ON/OFF dark setpoint.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mounting heights indicated are to bottom of unit for suspended devices and to center of unit for wall-mounting devices.

3.2 CONTROL WIRING INSTALLATION

- A. Install wiring between sensing and control devices according to manufacturer's written instructions and as specified in Division 16 Section "Basic Electrical Materials and Methods."
- B. Bundle, train, and support wiring in enclosures.

3.3 IDENTIFICATION

- A. Identify components and power and control wiring according to Division 26 Section "Basic Electrical Materials and Methods - Electrical Identification."

3.4 FIELD QUALITY CONTROL

- A. Inspect control components for defects and physical damage, testing laboratory labeling, and nameplate compliance with the Contract Documents.
- B. Electrical Tests: Use particular caution when testing devices containing solid-state components. Perform the following according to manufacturer's written instructions:
 - 1. Continuity tests of circuits.
 - 2. Operational Tests: Set and operate devices to demonstrate their functions and capabilities in a methodical sequence that cues and reproduces actual operating functions. Record control settings, operations, and functional observations.
 - 3. Correct deficiencies, make necessary adjustments, and retest. Verify that specified requirements are met.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices. Refer to Division 1 Section "Contract Closeout and Final Cleaning: Demonstration and Training."

END OF SECTION

06/08/18

SECTION 26 27 26

WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Single and duplex receptacles, ground-fault circuit interrupters.
 - 2. Single- and double-pole snap switches and dimmer switches.
 - 3. Device wall plates.
 - 4. Floor service outlets, poke-through assemblies and multi-outlet assemblies.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Wiring Devices:
 - a. Bryant Electric, Inc./Hubbell Subsidiary.
 - b. Eagle Electric Manufacturing Co., Inc.
 - c. Hubbell Incorporated; Wiring Device-Kellems.
 - d. Leviton Mfg. Company Inc.
 - e. Pass & Seymour/Legrand; Wiring Devices Div.

2. Multi-outlet Assemblies:
 - a. Hubbell Incorporated; Wiring Device-Kellems.
 - b. Wiremold Company (The).
3. Poke-Through, Floor Service Outlets and Telephone/Power Poles:
 - a. Hubbell Incorporated; Wiring Device-Kellems.
 - b. Pass & Seymour/Legrand; Wiring Devices Div.
 - c. Square D/Groupe Schneider NA.
 - d. Thomas & Betts Corporation.
 - e. Wiremold Company (The).

2.2 RECEPTACLES

- A. Straight-Blade-Type Receptacles: Comply with NEMA WD 1, NEMA WD 6, DSCC W-C-596G, and UL 498.
- B. Straight-Blade and Locking Receptacles: Heavy-Duty grade.
- C. Straight-Blade Receptacles: Hospital grade.
- D. GFCI Receptacles: Straight blade, non-feed-through type, Hospital or Heavy-Duty grade, with integral NEMA WD 6, Configuration 5-20R duplex receptacle; complying with UL 498 and UL 943. Design units for installation in a 2-3/4-inch- deep outlet box without an adapter.

2.3 SWITCHES

- A. Single- and Double-Pole Switches: Comply with DSCC W-C-896F and UL 20.
- B. Snap Switches: Heavy-Duty grade, quiet type.
- C. Combination Switch and Receptacle: Both devices in a single gang unit with plaster ears and removable tab connector that permit separate or common feed connection.
 1. Switch: 20 A, 120/277-V ac.
 2. Receptacle: NEMA WD 6, Configuration 5-15R.
- D. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on/off switches and audible frequency and EMI/RFI filters.
 1. Control: Continuously adjustable slider; with single-pole or three-way switching to suit connections.
 2. Incandescent Lamp Dimmers: Modular, 120 V, 60 Hz with continuously adjustable rotary knob, toggle switch, or slider; single pole with soft tap or other quiet switch; EMI/RFI filter to eliminate interference; and 5-inch wire connecting leads.
 3. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

2.4 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Finished Spaces:
 - a. Steel with white baked enamel, suitable for field painting
 - b. 0.035-inch- thick, satin-finished stainless steel (above counters and in restrooms)
 - 3. Material for Unfinished Spaces: Galvanized steel.
 - 4. Material for Wet Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in "wet locations."

2.5 FLOOR SERVICE FITTINGS

- A. Type: Modular, flush-type, dual-service units suitable for wiring method used.
- B. Compartments: Barrier separates power from voice and data communication cabling.
- C. Service Plate: Rectangular, solid brass with satin finish.
- D. Power Receptacle: NEMA WD 6, Configuration 5-15R, gray finish, unless otherwise indicated.
- E. Voice and Data Communication Outlet: See telecommunication specifications for requirements.

2.6 POKE-THROUGH ASSEMBLIES

- A. Description: Factory-fabricated and -wired assembly of below-floor junction box with multichanneled, through-floor raceway/firestop unit and detachable matching floor service outlet assembly.
 - 1. Service Outlet Assembly: Flush type with two simplex receptacles and space for two RJ-45 jacks.
 - 2. Size: Selected to fit nominal 4-inch cored holes in floor and matched to floor thickness.
 - 3. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
 - 4. Closure Plug: Arranged to close unused 4-inch cored openings and reestablish fire rating of floor.
 - 5. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors; and a minimum of four, 4-pair, Category 5 voice and data communication cables.

2.7 MULTIOUTLET ASSEMBLIES

- A. Components of Assemblies: Products from a single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.

- B. Raceway Material: PVC.
- C. Wire: No. 12 AWG.

2.8 FINISHES

- A. Color:
 - 1. Wiring Devices Connected to Normal Power System: As selected by Architect, unless otherwise indicated or required by NFPA 70.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install devices and assemblies level, plumb, and square with building lines.
- B. Install wall dimmers to achieve indicated rating after derating for ganging.
- C. Install unshared neutral conductors on line and load side of dimmers.
- D. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and with grounding terminal of receptacles on bottom. Group adjacent switches under single, multigang wall plates.
- E. Remove wall plates and protect devices and assemblies during painting.
- F. Adjust locations of floor service outlets to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

- A. Comply with Division 26 Section "Basic Electrical Materials and Methods."
 - 1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 CONNECTIONS

- A. Ground equipment according to Division 26 Section "Grounding and Bonding."
- B. Connect wiring according to Division 26 Section "Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections:
 - 1. After installing wiring devices and after electrical circuitry has been energized, test for proper polarity, ground continuity, and compliance with requirements.
 - 2. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.
- B. Remove malfunctioning units, replace with new units, and retest as specified above.

END OF SECTION

06/08/18

SECTION 26 51 00
INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide new direct/indirect lighting with average of 50 foot-candles horizontal and minimum of 5 foot-candles vertical.

1.2 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with
 - 1. CEC: California Electrical Code.
 - 2. UL:
 - a. UL 875 - Light Emitting Diode (LED) Lighting Sources for Use in Lighting Products
 - b. UL 1598 - Luminaires.
 - c. UL 1012 - Power Units Other Than Class 2.
 - d. UL 1310 - Class 2 Power Units.
 - e. UL 2108 - Low Voltage Lighting Systems.
 - 3. ANSI:
 - a. C78.377.2008 Specifications for the Chromaticity of Solid State Lighting Products
 - 4. IESNA:
 - a. LM 79-80 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products.
 - b. LM 80-08 Approved Method for lumen Maintenance Testing of LED Light Sources.
 - c. TM 20-11 Projecting Long Term Lumen Maintenance of LED Light Sources.
- C. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

1.3 SUBMITTALS

- A. Manufacturer's Product Data:
 - 1. List of Materials: For each item, Include:
 - a. Manufacturer.
 - b. Model number.
 - c. Listing: UL, City Lab or none.
 - d. Quantity.
 - 2. Manufacturer's Product Data: In sequence of List of Materials, Data sheet for each item, including all accessories, marked for proposed product.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Products: Subject to compliance with requirements, provide one of the products specified.

2.2 FIXTURES AND COMPONENTS, GENERAL

- A. Air-Handling Fixtures: For use with plenum ceiling for air return and heat extraction and for attaching an air-diffuser-boot assembly specified in Division 23 Section "Diffusers, Registers, and Grilles."
 - 1. Air Supply Units: Slots in one or both side trims join with air-diffuser-boot assemblies.
 - 2. Heat Removal Units: Air path leads through lamp cavity.
 - 3. Combination Heat Removal and Air Supply Unit: Heat is removed through lamp cavity at both ends of the fixture door with air supply same as for air supply units.
 - 4. Dampers: Operable from outside fixture for control of return-air volume.
 - 5. Static Fixtures: Air supply slots are blanked off, and fixture appearance matches active units.

2.3 LIGHTING FIXTURES

- A. Fixture: Energy efficient volumetric type meeting Title 24 and District standards.

2.4 EXIT SIGNS

- A. General: Comply with UL 924; for sign colors and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
 - 1. Lamps for AC Operation: Light-emitting diodes with 25 years warranty.
- C. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 - 1. Battery: Sealed, maintenance-free, nickel-cadmium type with special warranty.
 - 2. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - 3. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.

2.5 EMERGENCY LIGHTING UNITS

- A. General: Self-contained units complying with UL 924.
 - 1. Battery: Sealed, maintenance-free, lead-acid type with minimum 10-year nominal life and special warranty.
 - 2. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - 3. Operation: Relay automatically turns lamp on when power supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - 4. Wire Guard: Where indicated, heavy-chrome-plated wire guard protects lamp heads or fixtures.

5. Integral Time-Delay Relay: Holds unit on for fixed interval when power is restored after an outage; time delay permits high-intensity-discharge lamps to restrike and develop adequate output.

2.6 LED LIGHTING

- A. Correlated color temperature (CCT): 3500 °K.
- B. Color rendering index (CRI): 75 minimum.
- C. Off-state power consumption: The power draw of the luminaire (including PE or remote monitoring unit) shall not exceed 2.50 watts when in the off state.
- D. Operating environment: Luminaire shall be able to operate normally in temperatures from -20° C to 50° C.
- E. Cooling system: Shall consist of a heat sink with no fans, pumps, or liquids, and shall be resistant to debris buildup that does not degrade heat dissipation performance.
- F. Lumen depreciation: LED module(s)/array(s) shall deliver at least 70% of initial lumens, when installed for a minimum of 100,000 hours.
- G. Lighting Distribution: Per lighting fixture schedule and in accordance with IESNA Lighting Distributions.
- H. Maximum amperage at LED: Maximum amperage at LED shall not exceed driver current to meet lumen depreciation value described above but shall not exceed 700 mA per mm² of chip. Multi-current (dimming) driver output shall be within the limits described in this Section. Provision only for dimming function controllable via networked control system.
- I. The Driver and LED arrays shall be designed for multi-current input operation, with adjustable ratings at 350 mA, 525 mA and 700 mA.
- J. Transient protection: Per IEEE C.62.41-1991, Class A operation. The line transient shall consist of seven strikes of a 100k HZ ring wave, Min. 10kV level, for both common mode and differential mode.
- K. Operating temperature: Power supply shall operate between -20° C and 50° C.
- L. Frequency: Output operating frequency must be ≥ 120 Hz (to avoid visible flicker) and input operating frequency of 60 Hz.
- M. Interference: Power supplies shall meet FCC 47 CFR Part 15/18 (Consumer Emission Limits).
- N. Noise: Power supply shall have a Class A sound rating per ANSI Standard C63.4.
- O. Fixture Warranty: Manufacturer shall warranty to replace defective light fixtures or parts thereof for a period of 5 years.

2.7 FIXTURE SUPPORT COMPONENTS

- A. Comply with Division 26 Section "Basic Electrical Materials and Methods" for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch.

- C. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- D. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated, 12 gage.
- E. Wires For Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, 12 gage.
- F. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- G. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

2.8 LIGHTING CONTROL DEVICES

- A. Dimming Driver Controls: Sliding-handle type with on/off control; compatible with driver and having light output and energy input over the full dimming range.
- B. Light Level Sensor: Detect changes in ambient lighting level and provide dimming range of 20 to 100 percent in response to change.
 - 1. Sensor Capacity: At least 40 electronic dimming driver.
 - 2. Adjustable Ambient Detection Range: 10 to 100 fc minimum
- C. Occupancy Sensors: Adjustable sensitivity and off delay time range of 5 to 15 minutes.
 - 1. Device Color:
 - a. Wall Mounted: White.
 - b. Ceiling Mounted: White.
 - 2. Occupancy detection indicator.
 - 3. Ultrasonic Sensors: Crystal controlled with circuitry that causes no detection interference between adjacent sensors.
 - 4. Infrared Sensors: With daylight filter and lens to afford coverage applicable to space to be controlled.
 - 5. Combination Sensors: Ultrasonic and infrared sensors combined.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
- B. Support for Fixtures in or on Grid-Type Suspended Ceilings: Provide both grid and additional wire supports. Refer to DSA IR 25-2/1.11 for requirements.
 - 1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches from fixture corners.
 - 2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
 - 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
 - 4. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.
- C. Suspended Fixture Support: As follows:
 - 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
 - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.

3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
 4. Continuous Rows: Suspend from cable.
- D. Air-Handling Fixtures: Install with dampers closed and ready for adjustment.
- E. Adjust aimable fixtures to provide required light intensities.

END OF SECTION

06/08/18

SECTION 26 56 00

EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide pole and wall mounted exterior lighting per Code requirements and District Standards. General site lighting shall be 0.5 foot-candles average maintained.
- B. Provide emergency egress exterior lighting per CBC requirements with 1 foot-candles maintained light level along path of egress to public ways.

1.2 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with:
 - 1. IEEE C2, "National Electrical Safety Code."
 - 2. CEC: California Electrical Code.
 - 3. UL:
 - a. UL 875 - Light Emitting Diode (LED) Lighting Sources for Use in Lighting Products.
 - b. UL 1598 - Luminaires.
 - c. UL 1012 - Power Units Other Than Class 2.
 - d. UL 1310 - Class 2 Power Units.
 - e. UL 2108 - Low Voltage Lighting Systems.
 - 4. ANSI:
 - a. C78.377.2008 Specifications for the Chromaticity of Solid State Lighting Products
 - 5. IESNA:
 - a. LM 79-80 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products.
 - b. LM 80-08 Approved Method for lumen Maintenance Testing of LED Light Sources.
 - c. TM 20-11 Projecting Long Term Lumen Maintenance of LED Light Sources.

1.3 SUBMITTALS

- A. Manufacturer's Product Data:
 - 1. List of Materials: For each item, Include:
 - a. Manufacturer.
 - b. Model number.
 - c. Listing: UL, City Lab or none.
 - d. Quantity.
 - 2. Manufacturer's Product Data: In sequence of List of Materials, Data sheet for each item, including all accessories, marked for proposed product.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Products: Subject to compliance with requirements, provide one of the products specified.

2.2 EXTERIOR LUMINAIRES, GENERAL

- A. Complying with UL 1598 and listed for installation in wet locations.
- B. Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.
- C. Metal Parts: Free of burrs and sharp corners and edges.
- D. Sheet Metal Components: Corrosion-resistant aluminum, unless otherwise indicated. Form and support to prevent warping and sagging.
- E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.
- F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.
- G. Exposed Hardware Material: Stainless steel.
- H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
- I. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
- J. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

2.3 PHOTOELECTRIC RELAYS

- A. UL 773 or UL 773A listed, factory mounted to the luminaire.
- B. Contact Relays: Single throw, designed to fail in the on position, and factory set to turn light unit on at 1.5 to 3 fc and off at 4.5 to 10 fc with 15-second minimum time delay. Contacts shall have directional lens in front of photocell to prevent fixed light sources to cause turnoff.
 - 1. Relay with locking-type receptacle shall comply with NEMA C136.10.
 - 2. Adjustable window slide for adjusting on-off set points.

2.4 LED LIGHTING

- A. Correlated color temperature (CCT): 3500 °K.
- B. Color rendering index (CRI): 75 minimum.
- C. Off-state power consumption: The power draw of the luminaire (including PE or remote monitoring unit) shall not exceed 2.50 watts when in the off state.
- D. Operating environment: Luminaire shall be able to operate normally in temperatures from -20° C to 50° C.
- E. Cooling system: Shall consist of a heat sink with no fans, pumps, or liquids, and shall be resistant to debris buildup that does not degrade heat dissipation performance.
- F. Housing: Shall be primarily constructed of metal. Unless otherwise noted, finish shall be white in color, powder coated and rust resistant, unless otherwise noted; driver shall be mounted internally, be replaceable, and be accessible without tools. Captive screws or use of latches are needed on any components that require maintenance after installation. For exterior fixtures, no parts shall be constructed of polycarbonate unless it is UV stabilized (lens discoloration shall be considered a failure under warranty); ingress Protection shall be rated a minimum of IP54.
- G. Lumen depreciation: LED module(s)/array(s) shall deliver at least 70% of initial lumens, when installed for a minimum of 100,000 hours.
- H. Lighting Distribution: Per lighting fixture schedule and in accordance with IESNA Lighting Distributions.
- I. Maximum amperage at LED: Maximum amperage at LED shall not exceed driver current to meet lumen depreciation value described above but shall not exceed 700 mA per mm² of chip. Multi-current (dimming) driver output shall be within the limits described in this Section. Provision only for dimming function controllable via networked control system.
- J. The Driver and LED arrays shall be designed for multi-current input operation, with adjustable ratings at 350 mA, 525 mA and 700 mA.
- K. Transient protection: Per IEEE C.62.41-1991, Class A operation. The line transient shall consist of seven strikes of a 100k HZ ring wave, Min. 10kV level, for both common mode and differential mode.
- L. Operating temperature: Power supply shall operate between -20° C and 50° C.
- M. Frequency: Output operating frequency must be ≥ 120 Hz (to avoid visible flicker) and input operating frequency of 60 Hz.
- N. Interference: Power supplies shall meet FCC 47 CFR Part 15/18 (Consumer Emission Limits).
- O. Noise: Power supply shall have a Class A sound rating per ANSI Standard C63.4.
- P. Fixture Warranty: Manufacturer shall warranty to replace defective light fixtures or parts thereof for a period of 5 years.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install lamps in each fixture.

- B. Luminaire Attachment: Fasten to indicated structural supports.
- C. Adjust luminaires that require field adjustment or aiming.

END OF SECTION

06/08/18

SECTION 27 00 00

GENERAL TECHNOLOGY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The provisions of the General Conditions, Special Conditions, and the Sections included under Division 01, General Requirements, are included as a part of this section as though bound herein.

1. DRAWINGS:

- a. The Drawings prepared for this Project are an outline to show where apparatus must go in order to harmonize with the building and installations of the various trades. Work must be installed in accordance with the drawings insofar as possible. Drawings shall be carefully checked during the course of bidding and construction. If discrepancies, errors, or omissions are discovered prior to or during the construction phase, notify the Owner's Agent immediately for interpretation or correction. Take necessary measurements and be responsible for same, including clearances for equipment that is to be furnished. The Owner shall reserve the right to make minor location changes of equipment where such adjustments are deemed desirable from an appearance or operational standpoint. Such changes will be anticipated sufficiently in advance to avoid extra work or unduly delayed progress on the Project.

1.2 SUMMARY

A. RELATED SECTIONS

1. The requirements of this Section supplement the General Conditions and shall apply to Work for Sections listed under Division 27 – COMMUNICATIONS.

B. PERFORMANCE

1. Provide the labor, materials, equipment, appliances, services and transportation, and perform the operations in connection with the construction and installation of the Work. Work shall be as herein specified and as denoted on the accompanying Drawings.

1.3 DEFINITIONS

A. PRECEDENCE:

1. Precedence of project documents shall be as follows:
- a. In the event of a discrepancy between the specifications and drawings, whichever is more stringent or calls for the highest quantity or quality of materials has precedence.

B. OMISSIONS:

1. The omission of express reference to any parts necessary for, or reasonably incidental to, a complete installation shall not be construed as a release from providing such parts.

C. ANCILLARY AND ACCESSORY ITEMS:

1. No exclusion from, or limitations in, the language used in the drawings or specifications shall be interpreted as meaning that the accessories necessary to complete any required system or item of equipment are to be omitted.

D. DRAWINGS:

1. The drawings of necessity utilize symbols and schematic diagrams to indicate various items of work. Neither of these have any dimensional significance nor do they delineate every item required for the intended installations. The work shall be installed in accordance with the intent diagrammatically expressed on the drawings and described in these specifications. No interpretation shall be made from the limitations of symbols and diagrams that any elements necessary for complete work are excluded.

E. ORDINANCES:

1. All work shall conform to all federal, state, and local ordinances and building official requirements.

F. BUILDING CODES:

1. All work shall conform to all state and local building codes and the following:
 - a. National Electrical Code (NEC)
 - b. National Fire Protection Association (NFPA)
 - c. EIA/TIA Standards and Recommendations.

G. UL LISTING

1. All material and equipment shall be listed, labeled, or certified by Underwriter's Laboratories, Inc., where such standards have been established.

H. FCC APPROVAL

1. The system shall be approved for direct interconnection to the utility services under Part 68 of FCC rules and regulations. Those systems that are not FCC approved or utilize an intermediary device for connection will not be considered. Provide FCC registration number of system being proposed with submittals.

I. SUBMITTALS

1. GENERAL:
 - a. Provide complete shop drawings and submittals for all systems specified within 30 days of notice of award or actual award of contract which ever occurs first. The Architect/Consultant will review and return submittals and shop drawings within fourteen (14) days. Failure to obtain submittal approval within sixty (60) days of contract award, where the delay is due to the poor performance of the contractor, may be cause for cancellation of the contract without penalty of the Owner.
 - b. Where applicable, the Contractor will submit the greatest quantity of submittal copies noted herein or in the General or Supplemental Conditions of the project documents. If not noted elsewhere within the project documents, the Contractor will submit a minimum of five (5) sets of submittals and shop drawings.
 - c. The Contractor should not consider the Consultant or Owner's review of submittals to be exhaustive or complete in every detail. Approval of submittals, in-

cluding substitutions, indicates only the acceptance of intent to comply with general design or method of construction and quality as specified. The functional requirements, operations, arrangements, and quantities must comply with the contract documents unless changes are specifically approved in writing. Submittal approval does not relieve the Contractor of responsibility for errors in dimensions, details, sizes, etc., or coordinating items with actual building conditions. Contractor's responsibility for error and omissions in submittals is not relieved by the Consultant or Owner review of submittals.

- d. Submittals and shop drawings will be provided in a single package, multiple partial submittals are not acceptable.
- e. Submittals which, in the Consultant's opinion, are incomplete deviate significantly from the requirements of the Project Specifications, or contain numerous errors will be returned without review for rework and are to be re-submitted.
- f. If submittals and/or drawings are rejected, or approved with noted changes and resubmittal required, the Contractor will correct the documents as required and resubmit within fourteen (14) days.
- g. The Contractor will not fabricate products, begin work, or submit invoices for the scope of work defined in the project documents until return of submittals and shop drawings with Consultant acceptance.

2. SCALED DRAWINGS (Shop Drawings):

- a. Each drawing shall have a descriptive title and all subparts of each drawing shall be completely described. All drawings shall have the name of the project, Owner's name and address, consultant, and electronics contractor in the title block.
- b. Cabinets:
 - 1) Provide complete scaled elevation drawings of all equipment racks with equipment identification number. Each drawing shall show all equipment with its manufacturer, model number, and specific room location. If other Contractor(s) are providing equipment in the room, this Contractor will coordinate the layout of the room with the other Contractor(s).
 - 2) Provide complete scaled floorplan drawings of all rooms where equipment racks or cabinets are located with location and orientation of every rack or cabinet shown. Provide dimensional relation of each piece of equipment to other pieces of equipment, room walls, and ceiling.
- c. Backboards:
 - 1) Provide complete scaled elevation drawings of all backboards with equipment designations and locations. Provide dimensional relation of each piece of equipment to other pieces of equipment. If other Contractor(s) are providing equipment on the backboard, this Contractor will coordinate the layout of equipment on the backboard with the other Contractor(s).
- d. Primary Cable Paths and Device Locations:
 - 1) Provide complete scaled drawings detailing projected primary cable paths and locations of all equipment such as control panels, plug panels, video monitors, video projectors, equipment racks, speakers, etc...

in quantities noted in the general requirements. These drawings will be utilized for "as-built" submittals with cable numbers noted at the end of the project.

e. Assembly, Supports, and Panel/Plate Layout:

- 1) Provide diagrammatic representation of all assemblies, i.e. monitor mount assembly, projector mount assembly, and connector panel and/or plate layout. Identify the components that make up the assembly or are used on the panel/plate. For connector panel or plate, indicate identification location and methodology.

f. One-Line System Diagram:

- 1) Provide one-wire drawings of all racks, consoles, control panels, and custom assemblies, etc., in quantities noted in the general requirements. Each drawing shall delineate circuit numbers for all cables and terminal connections. Provide typical wiring termination for all devices.

3. MANUFACTURERS PRODUCT DATA

a. Manufacturer Cut Sheets:

- 1) Provide complete sets of a project material list with manufacturer specification sheets for each manufactured device utilized within the system in quantities noted in the general requirements. The Owners Agent will use these sets in determining that all products listed are being supplied as required.

b. Samples:

- 1) Provide samples of the following:
 - a) Any plastic or custom metal panels.
 - b) All paint finishes of cabinets or custom assemblies. (These may be manufacturer cuts sheets indicating the various colors and finishes available).
 - c) Equipment identification tag material, labeling method, and numbering method.
 - d) Cable labeling material, labeling method, and numbering method.
 - e) Faceplate and modules of selected color for approval by Owner/architect.
 - f) Faceplate labeling material, labeling method, and numbering method.

4. SCHEDULE:

- a. The Consultant has been retained by the Owner to provide inspection services throughout the duration of the project. Those services include:
 - 1) Inspection of technology rough-in methodologies (cable installation and support methods, component support methodologies.)

- 2) Inspection of cable, face plate, and cabinet termination and labeling methodologies.
 - 3) Review of Verification Test Reports.
 - 4) Attend and Witness Final Acceptance Test (Proof of Performance Tests).
 - 5) Verify Contractor provision of training requirements.
- b. The Contractor is required to provide a projected schedule of activities for the Consultant to plan site visits. The Contractor is responsible to notify the Consultant of any changes in their activity schedule due to change in the overall construction schedule or Contractor schedule. Provide dates for the following:
- 1) Date upon which 10% of the project cable is expected to be installed.
 - 2) Date upon which 10% of system supports are expected to be installed.
 - 3) Date upon which 10% of cable and plates are terminated and labeled.
 - 4) Date of Verification Test Report completion.
 - 5) Date of expected Final Acceptance Testing.
 - 6) Dates of expected Systems Training.

1.4 QUALITY ASSURANCE

A. GENERAL:

1. All equipment and materials required for installation under these specifications shall be new (less than 1 year from date of manufacture) and without blemish or defect.

B. SPECIFIC:

1. Each major component of equipment shall have the manufacturer's name, address, model number, and rating on a plate securely affixed in a conspicuous place. NEMA code ratings, UL label, or other data which is die-stamped into the surface of the equipment shall be stamped in a location easily visible.

1.5 ACCEPTABLE MANUFACTURERS

- A. These specifications are based on equipment manufactured by or for specific manufacturers. It is not the intent of these specifications to limit or restrict submission of proposals for products by other manufacturers but to set a baseline of operational functions, which all proposals must meet.

1.6 INSTALLING CONTRACTOR QUALIFICATIONS

- A. The Premises Wiring contractor performing work under Division 27, Section 27 15 00 shall be certified by the manufacturer of the equipment and components being furnished and be authorized by the manufacturer to install and convey the product warranty and performance guarantee to the Owner upon completion of contract. Installing contractor for all other sections must have a minimum of three years previous experience in audio/visual systems, and/or data communications, and/or telecommunication systems. All contractors and/or

vendors supplying all or parts of the work described herein shall supply three project references, which substantiate the contractor/ vendors' previous experience as noted herein and in addition Division 27 Section 27 15 00 contractor shall provide compliance to 27 15 00 para 1.3 D.

- B. Provide three project references for all subcontractors supplying all or parts of the work described herein which substantiate their previous experience as noted herein.

PART 2 - PRODUCTS

2.1 DEVICE LOCATIONS

- A. Locate all apparatus requiring adjustments, cleaning, or similar attention so it will be accessible for such attention. Equipment racks shall be positioned to permit full access for operation and service.

2.2 SUPPORTS

- A. Provide and install brackets, braces, and supports as required. Minimum fastening and/or support safety factor shall be at least three (3). Design shall be to the approval of the Owner.

2.3 PAINTING

- A. All supporting structures and enclosures supplied by the contractor not having a standard factory paint finish shall be painted in a manner approved by the Owner.

2.4 PAINT COLOR

- A. Provide, as may be required, custom color and/or finish for any equipment or materials supplied which are exposed to public view. Color and finish of all such equipment or materials shall be submitted to the Architect for approval. This does exclude equipment or materials where standard colors and finishes are specified herein, unless otherwise noted.

2.5 BLANK AND CUSTOM PANELS

- A. Finish of blank panels and/or custom assembly panels utilized for termination and/or interconnection as part of this system shall be stainless steel.
- B. In addition, provide blank plastic panels finished in matte (or satin) black to close off all spaces around the source equipment in the distribution room racks. These panels shall have cutouts that provide access to the source machine and its controls. Match each panel to the device it is covering in the racks. Submit a sample of the plastic with finish to the Consultant for approval.

2.6 MARKINGS

- A. Switches, connectors, jacks, receptacles, outlets, cables and cable terminations shall be logically and permanently marked in a manner approved by the Owner. Custom panel nomenclature shall be engraved, etched, or screened. Marking for these items are purposely detailed in the drawings to ensure consistency and clarity. Verify any changes in working type size, and/or placement with the Owner prior to marking. Mount on the custom rack

panels as described above a designation of each source machine, which correlates to the system architecture. Submit a sample layout for Consultant approval.

2.7 ENVIRONMENT

- A. The equipment specified herein is designed to operate in environments of normal humidity, dust, and temperature. Protect equipment and related wiring where extreme environmental conditions can occur.

2.8 REFERENCE STANDARDS

- A. NOTE: Educational facilities are unique facilities and do not specifically conform to the TIA/EIA standard, they are not commercial buildings that must flex with each new tenant. The Owner will deviate from the standard to enhance the instructional impact of the technology implementation. Deviations will be noted below:
 - 1. Quantity of drops in a given space.
 - 2. Quantity of drops within a single communications box.
 - 3. Use of a collapsed backbone data system architecture.
 - 4. Deletion of wiring closets (IDF).
 - 5. Fiber cable direct to the classroom.
 - 6. No patch panels in classrooms containing hub units.
 - 7. When wiring closets (IDF) are used, room size requirements are not strictly adhered to.
- B. Where practices noted within this specification do not adhere strictly to the TIA/EIA standards, The Owner has done so for a specific purpose related to educational facilities. For those areas deviating from the standard, this contractor will not be liable for complying with the TIA/EIA standards.
- C. The standard references for the layout and construction of the system shall be the current version of:
 - 1. GENERAL, (Includes Copper and Fiber):
 - a. TIA/EIA-568 - Commercial Building Standard for Telecommunications Wiring
 - b. TIA/EIA-569 - Commercial Building Standard for Telecommunications Pathways and Spaces.
 - c. TIA/EIA-606 - Administrative Standard for the Telecommunications Infrastructure of Commercial Buildings.
 - d. TIA/EIA-607 - Commercial Building Grounding/Bonding Requirements.
 - e. BICSI-TDM Manuals-Building Industry Consulting Service International-Telecommunications Distribution Methods Manuals.
 - f. ANSI - American National Standards Institute
 - g. UL Listed - Underwriter's Laboratories Listed

- h. UL Certified - Underwriter's Laboratories LAN Cable Certification Program.
 - i. NEMA - National Electrical Manufacturer's Association.
2. AUDIO:
- a. Handbook for Sound Engineers
 - b. The New Audio Cyclopedia (Howard W. Sams, Indianapolis, Indiana 1987)
 - c. Davis Sound System Engineering Second Edition (Howard W. Sams, Indianapolis, Indiana 1987)
3. VIDEO:
- a. National Association of Broadcasters.
 - b. Engineers Handbook.
4. ADDITIONAL: FIBER OPTICS
- a. Refer to the fiber optic cable manufacturers design guide:
 - 1) i.e. SIECOR:
 - a) Siecor Universal Transport System (UTS)
 - b) Design Guide, Siecor Corp.
 - 2) Brochure #CC-110.
 - 3) Also refer to the following standards committees:
 - a) ANSI: Proposed Fiber Distributed Data Interface (FDDI) Physical Media Documents
 - b) Institute of Electrical & Electronic Engineers (IEEE) 802.8
 - c) Electronic Industries Association (EIA) Committees:
 - 4) TR4 1.8.1: Working Group on Commercial & Industrial Building Wiring Standard.
 - 5) FO-6: Fiber Optic Committee.
 - 6) FO-6.7: Fiber Optic Cable Sub Committee.
 - 7) FO-2: Fiber Optic Systems Committee.
 - a) Insulated Cable Engineers Association Inc. (ICEA)
 - 8) WG 596: Fiber Optic Premises Distribution Cable.
 - 9) American Society for Testing and Materials (ASTM International).
 - 10) DO9.18, TG-12: Task Group on Fiber Optics.

PART 3 - EXECUTION

3.1 INSTALLATION

A. GENERAL

1. Perform this work in accordance with acknowledged industry and professional standards and practices, existing building conditions, and as specified herein. Provide and install all materials, devices, components, and equipment for complete, operational systems.
2. Maintain a competent supervisor and supporting technical personnel, acceptable to the Architect, during the entire installation. Change of the supervisor during the project shall not be acceptable without prior written approval from the Owner and the Owner's Agent.
3. Coordinate all efforts with those of related trades. In the event of any conflicts, delayed or improper preparatory work by others, notify the Owner's Agent. The Owner's Agent's decision will be binding. Verify all field conditions.

3.2 ELECTRICAL DISTRIBUTION

- A. Provide distribution of electrical power within the equipment racks with a minimum of one spare AC receptacle for each four in use per branch circuit or a minimum of two spare AC receptacles per branch circuit, whichever is greater. Power will be made available in each area. Where applicable, coordinate extension of those circuits by the District.

3.3 BOXES

A. MOUNTING

1. With the exception of portable equipment, all boxes, conduits, cabinets, equipment and related wiring shall be held firmly in place and the mounting shall be plumb and square. All boxes shall be rigidly and securely mounted to building structure. All boxes shall be installed so that wiring contained in them is accessible. Install blanking devices or threaded plugs in all unused holes.

B. WIRING

1. Wiring groups and circuits shall be isolated as indicated herein. Common pull or junction boxes shall be avoided. Where deemed necessary and approved, they shall be barrier.

C. CLEANING:

1. Clean all box interiors thoroughly before installing plates, panels, or covers.

3.4 WIRING METHODS & PRACTICES

A. SUPERVISION

1. Installation of all audio, video, control, and/or fiber cable to be provided under this scope of work is by this contractor. Supervision to include, but not be limited to ensuring proper:
 - a. Pulling Tensions.
 - b. Quantities.
 - c. Types.

- d. Lengths.
- e. Routing.
- f. Wire Group Separation.
- g. Identification.

B. IDENTIFICATION

- 1. All wires shall be permanently identified at each wire end utilizing a self-laminating wire or cable marker comprised of a white label with black lettering and clear over laminate area, in a manner approved by the Owner's Agent.
- 2. All faceplates will be permanently identified with engraved plastic laminate or metalized polyester identification labels.

C. TERMINAL BLOCKS

- 1. All terminal block connections shall be readily accessible. Not more than one wire connected to one terminal. Spare terminal blocks, equivalent to 10% of those in actual use shall be provided.

D. SPLICING

- 1. Splicing of cables is not permitted between terminations.

E. PULLING CABLE

- 1. Do not pull wire or cable through any box fitting or enclosure where change of raceway alignment or direction occurs; do not bend conductors to less than recommended radius. Employ temporary guides, sheaves, rollers, and other necessary items to protect cables from excess tension, abrasion, or damaging bending during installation. Care shall be taken not to bend, crush or kink cables.

F. CABLE MANAGEMENT

- 1. Building Locations: Comb straight and form in a neat and orderly manner all conductors in large junction boxes and cable support bridle rings or other types of open top support systems, providing circuit and conductor identification. Tie wraps are only to be used for cable management, not support. Arrange as required using tie wraps of appropriate size and type, (plenum rated as required). Limit spacing between ties to six inches and provide circuit and conductor identification at least once in each enclosure.
- 2. Equipment Cabinets or Racks: Comb straight and form in a neat and orderly manner all conductors located within equipment cabinets, located in the head end room or remote locations, and wiring harnesses in the head end room. Tie as required using Velcro cable ties of appropriate type and size.

G. SERVICE LOOPS

- 1. Provide ample service loops at each termination and/or per drawings so that plates, panels, and equipment can be dismounted for service and inspection. Provide the following as a minimum:
 - a. Outlet box: Eighteen (18) inches from wall surface to jack.

- b. Termination panel: Four (4) inches behind termination panel from last cable tie to jack.
- c. Fiber terminations: Eighteen (18) inches of service loop coiled and stored in junction box (refer to NEC for proper sizing of junction boxes and pull boxes). Take care not to exceed bend radius of fiber per recommended telecommunications standards.

H. NON-CABLE TRAY INSTALLATION

1. All cable installations which are not supported by a cable tray or conduit system and where educational technology system cables are allowed to be placed loosely in the ceiling must follow the TIA/EIA standard methodology as noted in TIA/EIA 569 - Part 4.6 Ceiling Pathways. Specifically, sections 4.6.1 General, 4.6.2 Design Guidelines, and 4.6.5 Cable Support. Those sections are paraphrased herein (the contractor will be familiar with the specifics of these sections and install their cables in accordance with the standard or as noted herein).
2. The installation of all education technology cabling, regardless of type and separation requirements, from the head end room to various zones throughout the facility will use common pathway routes.
3. Inaccessible ceiling areas, such as lock-in ceiling tiles, drywall or plaster, will not be used as distribution pathways. Should the contractor find inaccessible ceiling areas as the only available pathway, the contractor will notify the Owner's Agent immediately for direction prior to proceeding with the cable installation.
4. Accessible ceiling areas must have adequate and suitable space available for the distribution layout (minimum of three inches clear vertical space between ceiling tiles and distribution wiring and pathway).
5. The design shall provide a suitable means and method for supporting cables and wires from the head end room (and/or telecommunications closet) to the area being served. The cable will not be laid directly on the ceiling tiles or rail. The Owner allows the use of "Caddy - Multifunction Clip" (as manufactured by ERICO or other equivalent manufacturer) installed on the ceiling support wire at a minimum height of eighteen inches above the tile and utilizing the appropriate D-ring or bridle ring for the installation of cable within a single zone.
6. Cable support will be provided through the use of open-top cable supports located on 48-60 inch centers. Where large quantities of cables (50-75) are bunched together in the ceiling at a congested area, the contractor will use multiple open-top cable supports or a special support designed to carry the additional weight.
7. A single classroom or suite of offices (with an area not exceeding 1200 square) feet will be considered a single telecommunication zone. Instructional spaces which exceed the 1200 square foot limit must be brought to the attention of the Owner's Agent for review and approval as a single zone. Loose cables from each zone to the telecommunications closet or headend room will be grouped and tied.

I. WIRING HARNESESSES

1. All wires and cables used in assembling custom panels and equipment racks shall be formed into harnesses, tied with Velcro tie wraps and supported in accordance with accepted engineering practice.
2. Harnessed cables shall be combed straight. Each cable that breaks out from a harness for termination shall be provided with an ample service loop.

3. Harnessed cables shall be formed in either a vertical or horizontal relationship to equipment, controls, components, or terminations.

J. FIBER OPTIC CABLE

1. All cable shall be installed and terminated in accordance with the manufacturer's recommended procedures. All cables shall be continuous between terminals with no splicing. All cables will be terminated with SC type connectors and terminated into their respective classroom terminals and central racks.

3.5 GROUNDING

A. GROUNDING PROCEDURE

1. The system wiring will conform to the following procedures:

ITEM	PROCEDURE
Equipment AC Ground Pins:	Connect to AC ground.
Equipment Chassis:	Connect to AC ground and/or rack frames
Rack Frames:	Connect to AC ground. Use insulated bushings for all conduit connections
Shielded Cable Between AC powered equipment:	Connect to ground at one end only.
Unbalanced Equipment:	Float chassis from rack.
Conduit/Back Boxes:	Isolate system wiring, including AC power, from all conduits and permanent backboxes
AC Ground:	Green wire (grounding conductor) system shall be isolated from all other facility grounds. Connects at one point to earth.

B. METALLIC CONDUIT & ENCLOSURES

1. All metallic conduit, boxes, and enclosures shall be permanently and effectively grounded in accordance with the National Electrical Code. Metallic enclosures containing active equipment shall be grounded with due regard for minimization of electrical noise.

3.6 EQUIPMENT RACKS

A. GENERAL

1. The equipment racks shall be vented and considered as custom assemblies and shall be assembled, wired, and tested in a properly equipped shop maintained by the contractor. Assembly of racks on site will not be permitted.

B. EQUIPMENT LOCATION

1. Placement of equipment in equipment racks is for maximum operator convenience. Verify any changes in placement prior to assembly with the Owners Agent. All system components and related wiring will be located with due regard for the minimization of induced electromagnetic and electrostatic noise, for the minimization of wiring length, proper ventilation, and to provide reasonable safety and convenience for the operator. Fans shall be provided if required for proper ventilation. All cabling to the racks shall be ceiling access and within enclosures extending from the racks into the ceiling area.

C. RACK INSTALLATION

1. Racks shall be installed plumb and square without twists in the frames or variations in level between adjacent racks.

D. IDENTIFICATION

1. All terminal blocks, rack mounted equipment, and active slots of card frame systems shall be clearly and logically labeled in a manner acceptable to the Owner as to their function, circuit, or system as appropriate. Labeling on manufactured equipment shall be engraved plastic laminate with white lettering on black background or dark background. Handwritten identification is not permitted. The contractor may substitute metallized polyester permanent identification labels with black printing on silver, white, or another light color background for the phenolic labels above.

3.7 CABLE TEST METHODOLOGY

A. TEST DOCUMENTATION

1. Upon substantial completion of the data network and interfacing of the Owner supplied equipment, test every data port for the functional requirements as listed in previously. Document, on a contractor generated form, the compliance of every port and the testing individual will initialize the results of each location. Submit a written report detailing the results of initial adjustments and verification tests including all relevant drawings, charts, and photographs.

B. FIELD TEST REQUIREMENTS FOR A BALANCED TWISTED-PAIR CABLING SYSTEM

1. Every cabling link in the installation shall be tested in accordance with the Telecommunications Industry Association (TIA) standard ANSI/TIA/EIA-568-B.2-1 (June 2002) Section 11.2: "100-Ohm twisted-pair transmission performance and field test requirements".
2. The installed twisted-pair horizontal links shall be tested from the IDF in the telecommunications room to the telecommunication wall outlet in the work area against the "Permanent Link" performance limits specification as defined in ANSI/TIA/EIA-568-B.2-1 (June 2002).
3. 100% of the installed cabling links must be tested and must pass the requirements of the standards mentioned in subsection 1 above and as further detailed in Section 27 15 00 - Horizontal Cabling. Any failing link must be diagnosed and corrected. The corrective action shall be followed with a new test to prove that the corrected link meets the performance requirements. The final and passing result of the tests for all links shall be provided in the test results documentation as described below.
4. Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests. Appropriate training programs include but are not limited to installation certification programs provided by BICSI or the ACP (Association of Cabling Professionals).
5. The test equipment (tester) shall comply with or exceed the accuracy requirements for enhanced level II (Level II-E) field testers as defined in TIA-568-B; Annex I: Section I.4. The tester including the appropriate interface adapter must meet the specified accuracy requirements. The accuracy requirements for the permanent link test configuration (baseline accuracy plus adapter contribution) are specified in Table I.4 of Annex I of TIA/EIA-568-B.2. (Table I.5 in this TIA document specifies the accuracy requirements for the Channel configuration.)

6. The tester shall be within the calibration period recommended by the vendor in order to achieve the vendor-specified measurement accuracy.
7. The tester interface adapters must be of high quality and the cable shall not show any twisting or kinking resulting from coiling and storing of the tester interface adapters. In order to deliver optimum accuracy preference is given to a permanent link interface adapter for the tester that can be calibrated to extend the reference plane of the Return Loss measurement to the permanent link interface. The contractor shall provide proof that the interface has been calibrated within the period recommended by the vendor. To ensure that normal handling on the job does not cause measurable Return Loss change, the adapter cord cable shall not be of twisted-pair construction. The Fluke DSP-LIA101S permanent link adapter available for the DSP-4000 Series CableAnalyzer™ is an example of a tester interface that fully complies with this requirement.
8. The Pass or Fail condition for the link-under-test is determined by the results of the required individual tests (detailed in Section 27 15 00 - Horizontal Cabling). Any Fail or Fail* result yields a Fail for the link-under-test. In order to achieve an overall Pass condition, the results for each individual test parameter must Pass or Pass*.
9. A Pass or Fail result for each parameter is determined by comparing the measured values with the specified test limits for that parameter. The test result of a parameter shall be marked with an asterisk (*) when the result is closer to the test limit than the accuracy of the field tester. The field tester manufacturer must provide documentation as an aid to interpret results marked with asterisks. (Reference TIA-568-B; Annex I: Section I.2.2)
10. A representative of the end-user shall be invited to witness field testing. The representative shall be notified of the start date of the testing phase 5 business days before testing commences.
11. A representative of the end-user will select a random sample of 10% of the installed links. The representative (or his authorized delegate) shall test these randomly selected links and the results are to be stored in accordance with the prescriptions in Section 27 15 00 - Horizontal Cabling. The results obtained shall be compared to the data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the end-user representative shall repeat 100% testing and the cost shall be borne by the installation contractor.

C. BALANCED TWISTED-PAIR CABLING SYSTEM PERFORMANCE TEST PARAMETERS

1. The test parameters for Cat 6 are defined in ANSI/TIA/EIA standard 568-B.2-1 "*Parameters to be reported*". The test of each Cat 6 link shall contain all of the following parameters as detailed below. In order to pass the link test all measurements (at each frequency in the range from 1MHz through 250MHz) must meet or exceed the limit value determined in the above-mentioned Cat 6 standard.
 - a. Wire Map [as defined in TIA/EIA-568-B.2-1]: Wire Map shall report Pass if the wiring of each wire-pair from end to end is determined to be correct. The Wire Map results shall include the continuity of the shield connection if present.
 - b. Length [as defined in TIA/EIA-568-B.2-1]: The field tester shall be capable of measuring length of all pairs of a permanent link or channel based on the propagation delay measurement and the average value for NVP. The physical length of the link shall be calculated using the pair with the shortest electrical delay. This length figure shall be reported and shall be used for making the Pass/Fail decision. The Pass/Fail criteria are based on the maximum length al-

lowed for the permanent link configuration (90 meters – 295 ft) or the channel (100 meters – 328 ft) plus 10% to allow for the variation and uncertainty of NVP.

- c. Insertion Loss (Attenuation) [as defined in TIA/EIA-568-B.2-1]: Insertion Loss is a measure of signal loss in the permanent link or channel. The term 'Attenuation' has been used to designate "insertion loss". Insertion Loss shall be tested from 1 MHz through 250 MHz in maximum step size of 1 MHz. It is preferred to measure attenuation at the same frequency intervals as NEXT Loss in order to provide a more accurate calculation of the Attenuation-to-Crosstalk Ratio (ACR) parameter. Minimum test results documentation (summary results): Identify the worst wire pair (1 of 4 possible). The test results for the worst wire pair must show the highest attenuation value measured (worst case), the frequency at which this worst case value occurs, and the test limit value at this frequency.
- d. NEXT Loss, pair-to-pair [as defined in TIA/EIA-568-B.2-1]: Pair-to-pair near-end crosstalk loss (abbreviated as NEXT Loss) shall be tested for each wire pair combination from each end of the link (a total of 12 pair combinations). This parameter is to be measured from 1MHz through 250MHz. NEXT Loss measures the crosstalk disturbance on a wire pair at the end from which the disturbance signal is transmitted (near-end) on the disturbing pair. The maximum step size for NEXT Loss measurements shall not exceed the maximum step size defined in the standards as shown in Table 1, column 2. A smaller step size more accurately identifies worst case margin conditions (see summary results, below).

Table 1		
Frequency Range (MHz)	Maximum Step size (MHz)	Fluke DSP-4000 Fluke DSP-4100
1 – 31.25	0.15	0.10
31.26 – 100	0.25	0.20

Minimum test results documentation (summary results): Identify the wire pair combination that exhibits the worst case NEXT margin (1) and the wire pair combination that exhibits the worst value of NEXT (worst case). NEXT is to be measured from each end of the link-under-test. These wire pair combinations must be identified for the tests performed from each end. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.

- e. PSNEXT Loss [as defined in TIA/EIA-568-B.2-1]: Power Sum NEXT Loss shall be evaluated and reported for each wire pair from both ends of the link-under-test (a total of 8 results). PSNEXT Loss captures the combined near-end crosstalk effect (statistical) on a wire pair when all other pairs actively transmit signals. Like NEXT this test parameter must be evaluated from 1MHz through 250MHz and the step size may not exceed the maximum step size defined in the standards as shown in Table 1, column 2.
- f. Minimum test results documentation (summary results): Identify the wire pair that exhibits the worst case margin and the wire pair that exhibits the worst value for PSNEXT. These wire pairs must be identified for the tests performed from each end. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.

- g. **ELFEXT Loss, pair-to-pair** [as defined in TIA/EIA-568-B.2-1]: Pair-to-pair FEXT Loss shall be measured for each wire-pair combination from both ends of the link-under-test. FEXT Loss measures the unwanted signal coupling (crosstalk disturbance) on a wire pair at the opposite end (far-end) from which the transmitter emits the disturbing signal on the disturbing pair. FEXT is measured to compute ELFEXT Loss that must be evaluated and reported in the test results. ELFEXT measures the relative strength of the far-end crosstalk disturbance relative to the attenuated signal that arrives at the end of the link. This test yields 24 wire-pair combinations. ELFEXT is to be measured from 1MHz through 250MHz and the maximum step size for FEXT Loss measurements shall not exceed the maximum step size defined in the standards as shown in Table 1, column 2. Minimum test results documentation (summary results): Identify the wire pair combination that exhibits the worst case margin and the wire pair combination that exhibits the worst value for ELFEXT. These wire pairs must be identified for the tests performed from each end. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.
- h. **PSELFEXT Loss** [as defined in TIA/EIA-568-B.2-1]: Power Sum ELFEXT is a calculated parameter that combines the effect of the FEXT disturbance from three wire pairs on the fourth one. This test yields 8 wire-pair combinations. Each wire-pair is evaluated from 1MHz through 250MHz in frequency increments that do not exceed the maximum step size defined in the standards as shown in Table 1, column 2.

Minimum test results documentation (summary results): Identify the wire pair that exhibits the worst case margin and the wire pair that exhibits the worst value for PSELFEXT. These wire pairs must be identified for the tests performed from each end. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.

- i. **Return Loss** [as defined in TIA/EIA-568-B.2-1]: Return Loss (RL) measures the total energy reflected on each wire pair. Return Loss is to be measured from both ends of the link-under-test for each wire pair. This parameter is also to be measured from 1 through 100 MHz in frequency increments that do not exceed the maximum step size defined in the standards as shown in Table 1, column 2. Minimum test results documentation (summary results): Identify the wire pair that exhibits the worst case margin and the wire pair that exhibits the worst value for Return Loss. These wire pairs must be identified for the tests performed from each end. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.
- j. **ACR (Attenuation to crosstalk ratio)**: ACR provides an indication of bandwidth for the two wire-pair network applications. ACR is a computed parameter that is analogous to ELFEXT and expresses the signal to noise ratio for a two wire-pair system. This calculation yields 12 combinations – six from each end of the link.
Minimum test results documentation (summary results): Identify the wire pair combination that exhibits the worst case margin and the wire pair combination that exhibits the worst value for ACR. These wire pair combinations must be identified for the tests performed from each end. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.
- k. **PSACR**: The Power Sum version of ACR is based on PSNEXT and takes into account the combined NEXT disturbance of all adjacent wire pairs on each individual pair. This calculation yields 8 combinations – one for each wire pair from both ends of the link. Minimum test results documentation (summary results): Identify the wire pair that exhibits the worst case margin and the wire

pair that exhibits the worst value for PSACR. These wire pairs must be identified for the tests performed from each end. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.

- l. Propagation Delay [as defined in TIA/EIA-568-B.2-1: Propagation delay is the time required for the signal to travel from one of the link to the other. This measurement is to be performed for each of the four wire pairs. Minimum test results documentation (summary results): Identify the wire pair with the worst case propagation delay. The report shall include the propagation delay value measured as well as the test limit value.
- m. Delay Skew [as defined in TIA/EIA-568-B.1; Section 11.2.4.11]. This parameter shows the difference in propagation delay between the four wire pairs. The pair with the shortest propagation delay is the reference pair with a delay skew value of zero. Minimum test results documentation (summary results): Identify the wire pair with the worst case propagation delay (the longest propagation delay). The report shall include the delay skew value measured as well as the test limit value.

D. BALANCED TWISTED-PAIR CABLING SYSTEM TEST RESULT DOCUMENTATION

1. The test results information for each link shall be recorded in the memory of the field tester upon completion of the test.
2. The test results records saved by the tester shall be transferred into a Windows™-based database utility that allows for the maintenance, inspection and archiving of these test records. A guarantee must be made that the measurement results are transferred to the PC unaltered, i.e., "as saved in the tester" at the end of each test and that these results cannot be modified at a later time. Superior protection in this regard is offered by testers that transfer the numeric measurement data from the tester to the PC in a non-printable format such as the Fluke DSP-4000 Series CableAnalyzer™.
3. The database for the completed job shall be stored and delivered on CD-ROM including the software tools required to view, inspect, and print any selection of test reports.
4. A paper copy of the test results shall be provided that lists all the links that have been tested with the following summary information.
 - a. The identification of the link in accordance with the naming convention defined in the overall system documentation:
 - b. The overall Pass/Fail evaluation of the link-under-test including the NEXT Headroom (overall worst case) number.
 - c. The date and time the test results were saved in the memory of the tester.
5. General Information to be provided in the electronic data base with the test results information for each link:
 - a. The identification of the customer site as specified by the end-user.
 - b. The identification of the link in accordance with the naming convention defined in the overall system documentation.
 - c. The overall Pass/Fail evaluation of the link-under-test.
 - d. The name of the standard selected to execute the stored test results.

- e. The cable type and the value of NVP used for length calculations.
 - f. The date and time the test results were saved in the memory of the tester.
 - g. The brand name, model and serial number of the tester.
 - h. The identification of the tester interface.
 - i. The revision of the tester software and the revision of the test standards database in the tester.
 - j. The test results information must contain information on each of the required test parameters that are listed in Section 27 15 00 - Horizontal Cabling and as further detailed below under paragraph 6.
6. The detailed test results data to be provided in the electronic database for each tested link must contain the following information:
- a. For each of the frequency-dependent test parameters, the minimum test results documentation shall be stored for each wire-pair or wire-pair combination as observed from each end of the link. The minimum test results documentation for each test parameter shall be in compliance with the information described herein.
 - 1) Length: Identify the wire-pair with the shortest electrical length, the value of the length rounded to the nearest 0.5 m *[optional: foot]* and the test limit value
 - 2) Propagation delay: Identify the pair with the shortest propagation delay, the value measured in nanoseconds (ns) and the test limit value
 - 3) Delay Skew: Identify the pair with the largest value for delay skew, the value calculated in nanoseconds (ns) and the test limit value
 - 4) Insertion Loss (Attenuation): Minimum test results documentation as explained in Section 27 15 00 - Horizontal Cabling for the wire pair with the worst insertion loss
 - 5) Return Loss: Minimum test results documentation as explained in Section 27 15 00 - Horizontal Cabling. Identify as detected from each end of the link, the wire pair that exhibits the worst case margin and the wire pair with the worst RL. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.
 - 6) NEXT, ELFEXT, ACR: Minimum test results documentation as explained in Section 27 15 00 - Horizontal Cabling. Identify as measured from each end of the link, the wire pair combination that exhibits the worst case margin and the wire pair combination that delivers the worst case value. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.
 - 7) PSNEXT, PSELFEXT, and PSACR: Minimum test results documentation as explained in Section 27 15 00 - Horizontal Cabling. Identify as detected from each end of the link, the wire pair that exhibits the worst case margin and the wire pair with the worst value. Each reported case shall include the frequency at which it occurs as well as the test limit value at this frequency.

- 8) Link length, propagation delay, and delay skew shall be reported for each wire pair as well as the test limit for each of these parameters.

E. FIBER DISTRIBUTION SYSTEM VERIFICATION TESTS

1. Every fiber optic cabling link in the installation shall be tested in accordance with the field test specifications defined by the CENELEC (Comité Européen de Normalisation Electrotechnique) standard ISO/IEC 11801, TIA/EIA T568b.3 or by the appropriate network application standard(s) whichever is more demanding.
2. ISO/IEC 11801 defines the passive cabling network, to include cable, connectors, and splices (if present), between two optical fiber patch panels (connecting hardware). A typical horizontal link segment is from the telecommunications outlet/connector to the horizontal cross-connect. A building backbone cabling subsystem extends from building distributor(s) to the floor distributor(s). The test shall include the representative connector performance at the connecting hardware associated with the mating of patch cords. The test does not, however, include the performance of the connector at the interface with the test equipment.
3. 100% of the installed cabling links must be tested and must pass the requirements of the standards mentioned in E.1 above and as further detailed in Section 27 15 00 - Horizontal Cabling. Any failing link must be documented, diagnosed and corrected. The corrective action shall be followed with a new test to prove that the corrected link meets the performance requirements. The final and passing result of the tests for all links shall be provided in the test results documentation.
4. Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:
 - a. the manufacturer of the fiber optic cable and/or the fiber optic connectors
 - b. the manufacturer of the test equipment used for the field certification
 - c. training organizations authorized by BICSI (Building Industry Consulting Services International with headquarters in Tampa, Florida), Btec or City & Guilds.
5. The test equipment shall comprise optical power source and meter equipment in accordance with IEC 61280-4-1 (for multimode optical fibers) and IEC 61280-4-2 (for single mode optical fibers). The type of optical source and launch condition shall correspond with one of the categories defined in IEC 61280-4-1 (for multimode optical fibers) and IEC 61280-4-2 (for single mode optical fibers). The cabling interface adaptors consist of a number of test cords mating in accordance with IEC 61280-4-1 (for multimode optical fibers) and IEC 61280-4-2 (for single mode optical fibers). It is recommended to use a mandrel wrap and, where appropriate, cladding mode stripping techniques in order to maximize measurement repeatability. These should be established within the test cord. The mandrel used should be in accordance with IEC 61300-3-34 (5x15 mm for 50/125 μ m optical fiber).
6. The test equipment shall be within the calibration period recommended by the manufacturer in order to achieve the manufacturer-specified measurement accuracy. This period is normally 12 months.
7. The fiber optic launch cables and adapters must be of high quality and the cables shall not show excessive wear resulting from repetitive coiling and storing of the test equipment interface adapters. No index matching gel shall be used.

8. The Pass or Fail condition for the link-under-test is determined by the results of the required individual tests.
9. A Pass or Fail result for each parameter is determined by comparing the measured values with the specified test limits for that parameter.
10. A representative of the end-user shall be invited to witness field testing. The representative shall be notified of the start date of the testing phase five (5) business days before testing commences.
11. A representative of the end-user will select a random sample of 10% of the installed links. The representative (or his authorized delegate) shall test these randomly selected links and the results are to be stored in accordance with the prescriptions in Section 27 15 00 - Horizontal Cabling. The results obtained shall be compared to the data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the end-user representative shall repeat 100% testing and the cost shall be borne by the installation contractor.

F. FIBER DISTRIBUTION SYSTEM PERFORMANCE TEST PARAMETERS

1. ISO/IEC 11801 prescribes the single performance parameter for field testing of fiber optic links as link attenuation (alternative and equivalent term: insertion loss), when installing components compliant with this standard.
2. The link attenuation shall be calculated in accordance to the specifications within ISO/IEC 11801. These specifications are representative of the following formulas.

$$\text{Link Attenuation} = \text{Cable Attn} + \text{Connector Attn} + \text{Splice Attn}$$

$$\text{Cable Attn (dB)} = \text{Attenuation Coefficient (dB/km)} * \text{Length (km)}$$

3. The values for the *Attenuation Coefficient* are listed in the table below:

Type of Optical Fiber	Wavelength (nm)	Attenuation_Coefficient (dB/km)
Multimode 50/125 μ m	850	3.5
	1300	1.5
Single-mode	1310	1.0
	1550	1.0

Connector Attn (dB) = number of connector pairs * connector loss (dB)

Maximum allowable connector loss = 0.75 dB

Splice Attn (dB) = number of splices (S) * splice loss (dB)

Maximum allowable splice loss = 0.3 Db

4. Link attenuation does not include any active devices or passive devices other than cable, connectors, and splices, i.e. link attenuation does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers.
5. Test equipment such as the Fluke DSP-FTA410S for multimode using LEDs, the DSP-FTA440S for gigabit Ethernet multimode using VCSELs, or the DSP-FTA430S for singlemode using lasers that measures the link length and automatically calculates the link loss based on the above formulas is preferred.
6. The above link test limits attenuation are based on the use of the One Reference Jumper Method specified by Method 1 of IEC 61280-4-1 for multimode and Method 1 of EN 61280-4-2 for singlemode (or the equivalent method explained in Fluke Networks application note "Loss Testing of Premises Fiber Optic Links" (Lit # 1560065)).

The user shall follow the procedures established by these standards or application notes to accurately conduct performance testing.

7. The horizontal link (multimode): acceptable link attenuation for a multimode horizontal optical fiber cabling system is based on the maximum 90 m distance. The horizontal link should be tested at 850 nm and 1300 nm in one direction in accordance with Method 1 of IEC 61280-4-1, One Reference Jumper or Fluke Networks application note "Loss Testing of Premises Fiber Optic Links" (Lit # 1560065).
8. The backbone link (multimode) shall be tested in one direction at both operating wavelengths to account for attenuation deltas associated with wavelength.
9. Multimode backbone links shall be tested at 850 nm and 1300 nm in accordance with Method 1 of IEC 61280-4-1.
10. Because backbone length and the potential number of splices vary depending upon site conditions, the link attenuation equation shall be used to determine limit (acceptance) values.
11. Single-mode backbone links shall be tested at 1310 nm and 1550 nm in accordance with IEC 61280-4-2, One Reference Jumper or the equivalent method outlined in Fluke Networks application note "Loss Testing of Premises Fiber Optic Links" (Lit # 1560065).
12. All single-mode links shall be certified with test tools using laser light sources at 1310 nm and 1550 nm (See Note below).

a. NOTE:

- 1) Links destined to be used with network applications that use laser light sources (underfilled launch conditions) shall be tested with test equipment based on laser light sources categorized by a Coupled Power Ratio (CPR) of Category 2, Underfilled, per IEC 60825-2. This rule should be followed for cabling systems to support Gigabit Ethernet. Gigabit Ethernet only specifies laser light sources. Field test equipment based on LED (light emitting diode) light sources is a Category 1 device per IEC 60825-2 and typically yields high attenuation results.
- 2) For Gigabit Ethernet compliant certification (IEEE STD 802.3Z application), use test equipment such as the Fluke DSP-FTA440S which uses a VCSEL (Vertical cavity surface emitting laser) at 850 nm (compliant with 1000BASE-SX) and an FP laser at 1310 nm (compliant with 1000BASE-LX).

G. FIBER DISTRIBUTION SYSTEM PERFORMANCE TEST PARAMETERS TEST RESULT DOCUMENTATION

1. The test result information for each link shall be recorded in the memory of the field test equipment upon completion of the test.
2. The test result records saved by the test equipment shall be transferred into a Windows™-based database utility that allows for the maintenance, inspection and archiving of these test records.
3. A guarantee must be made that these results are transferred to the PC unaltered, i.e., "as saved in the test equipment" at the end of each test.
4. The popular 'csv' format (comma separated value format) does not provide adequate protection and shall not be acceptable.

5. The database for the completed job – including twisted-pair copper cabling links if applicable –shall be stored and delivered on CD-ROM; this CD-ROM shall include the software tools required to view, inspect, and print any selection of test reports.
6. A paper copy of the test results shall be provided that lists all the links that have been tested with the following summary information:
 - a. The identification of the link in accordance with the naming convention defined in the overall system documentation.
 - b. The overall Pass/Fail evaluation of the link-under-test including the Attenuation worst case margin (margin is defined as the difference between the measured value and the test limit value).
 - c. The date and time the test results were saved in the memory of the test equipment.
7. General Information to be provided in the electronic data base containing the test result information for each link:
 - a. The identification of the customer site as specified by the end-user.
 - b. The overall Pass/Fail evaluation of the link-under-test. The name of the standard selected to execute the stored test results.
 - c. The cable type and the value of the 'index of refraction' used for length calculations.
 - d. The date and time the test results were saved in the memory of the test equipment.
 - e. The brand name, model and serial number of the test equipment.
 - f. The revision of the test equipment software and the revision of the test standards database in the test equipment.
8. The detailed test results data to be provided in the electronic database for each tested optical fiber must contain the following information:
 - a. The identification of the link/fiber in accordance with the naming convention defined in the overall system documentation.
 - b. The attenuation measured at each wavelength, the test limit calculated for the corresponding wavelength and the margin (difference between the measured attenuation and the test limit value).
 - c. The link length shall be reported for each optical fiber for which the test limit was calculated based on the formulas previously shown.
 - d. All fiber optic cable shall be factory tested on a reel basis with performance data for each cable supplied to the contractor and to the Owner. Tests shall be conducted utilizing an OTDR (Optical Time Domain Reflectometer) at 850nm and 1300 nm with the attenuation in dB/km recorded for each fiber.

3.8 VERIFICATION TEST REPORT

- A. Submit a written report detailing the results of initial adjustments and verification tests including all relevant drawings, charts, and photographs. This report will be completed and submitted for review at least five (5) days prior to acceptance testing.

3.9 ACCEPTANCE TESTING

- A. The Acceptance Testing and provision of testing equipment will be the responsibility of and performed by the Contractor in the presence of the Owner, Architect, or the Owner's representative. Coordinate this period so that free access, work lighting, electrical is available on the site.
- B. Should the contractor schedule an Acceptance Test and the system or components are not ready for or fail Acceptance Testing, the contractor will pay for all subsequent trips and man-hours required for the consultant to properly document specification conformance by the contractor. The Owner will have the right to reduce pay requests or final application of payment to the contractor in an amount equal to the travel costs and man-hours expended by the Consultant and charged to the contractor. The Owner would then pay the Consultant from the funds withheld from the contractor.
- C. Upon witness of the Acceptance Testing and the determination, in the Consultant's opinion, that the Contractor has falsified the Verification Test Reports, the Owner has the right to hire an Independent Testing Agency to provide outside verification of the results. Falsification of the test results is defined as cables shown as testing correctly in the Verification Report fail during the Acceptance Testing. (The Contractor has the right to hire an Independent Testing Agency approved by the Consultant and the Owner directly.) Furthermore, the Owner will have the right to reduce pay requests or final application of payment to the Contractor in an amount equal to the travel costs and man-hours expended by the Independent Testing Agency and Consultant and charged to the contractor. The Owner would then pay the Independent Testing Agency and Consultant from the funds withheld from the contractor.

3.10 SYSTEM DOCUMENTATION

- A. Prior to final acceptance tests, the Contractor shall submit to the Owner three copies of an operating and maintenance manual for the system that has been installed. These manuals will be used during the final acceptance testing of the system. Each manual will contain the following information:
- B. As-built project drawings. Provide three copies.
- C. Manufacturer Operation and Maintenance manuals. Provide three copies.
- D. Where applicable, single line diagrams showing levels throughout system and impedances. Provide three copies.
- E. Copies of Training materials. Provide three copies
- F. Verification and Acceptance Test Reports. Provide three copies.

END OF SECTION

06/08/18

SECTION 27 15 00

HORIZONTAL CABLING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all labor, materials, tools and equipment required for the complete installation of work called for on the Construction Drawings and described in the Specifying Documentation.

1.2 SCOPE OF WORK

- A. This document describes the requirements for the contractors, products and installation relating to furnishing and installing Telecommunications Cabling systems.
- B. The Horizontal Cabling System as described in this document is comprised of cabling, infrastructure, Cable tray pathways and termination devices for Data systems.
- C. Contractor will provide a bid including all labor, materials, tools and equipment required for the complete installation of work called for on the Construction Drawings and described in this Document. It is the responsibility of the Contractor to provide all material necessary to provide a complete and operable system. If the contractor feels that the system described is incomplete they must address this in writing to the Owner/Owner's Representative before providing a bid.
- D. All questions concerning non specified product and services will be address to the Owner's Representative before Contactor provides a bid. Owner expects that by accepting the Contractor's bid proposal that the Contractor has provided a competent bid for a complete solution.
- E. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of telecommunications outlets, typical installation details, cable routing and outlet types will be provided as an attachment to this document.

1.3 REGULATORY REFERENCES

- A. Contractor will comply will all Federal, State, Local Codes/Regulations and Industries Standards.
 - 1. Federal:
 - a. NFPA 70 - National Electrical Code (NEC).
 - b. FCC; Part 15 & Part 6A8.
 - 2. State of California:
 - a. CCR Part 2 - California Building Code.
 - b. CCR Part 3 - California Electrical Code.
 - c. Occupational Safety and Health Act (OSHA).
 - d. Title 24, Building Standards, State of California.
 - e. Title 19, California Code of Regulations.
 - f. Title 8, Electrical Safety, State of California.
 - 3. Industry Standards.

- B. Industry Standards: The following industry standards are the basis for the structured cabling system described in this document.
1. ANSI/TIA:
 - a. ANSI/TIA-568-C.0 - Generic Telecommunications Cabling for Customer Premises, or most recent revision at the time of installation
 - b. ANSI/TIA-568-C.1 - Commercial Building Telecommunications Cabling Standards, or most recent revision at the time of installation
 - c. ANSI/TIA-568-C.2 - Balance Twisted Pair Communications and Components Standards, or most recent revision at the time of installation
 - d. ANSI/TIA-568-C.3 - Optical Fiber Cabling Components Standard
 - e. ANSI/TIA -942 -Telecommunications Infrastructure for Data Centers, or most recent revision at the time of installation
 - f. TIA-569-B - Commercial Building Standard for Telecom Pathways and Spaces, or most recent revision at the time of installation
 - g. ANSI/TIA-606-A - Administration Standard for the Telecommunications Infrastructure of Commercial Buildings, or most recent revision at the time of installation
 - h. ANSI-J-STD-607-A - Commercial Building Grounding/Bonding Requirements, or most recent revision at the time of installation
 - i. ANSI/TIA 1152 - Testing of Copper Links
 2. National Electrical Codes:
 - a. National Electrical Safety Code (NESC) (IEEE C 2)
 - b. National Electrical Code (NEC) (NFPA 70)
 3. ISO/IEC:
 - a. ISO 11801 - Generic Cabling for Customer Premises
 4. OSHA Standards and Regulations – all applicable.
 5. Local Codes and Standards – all applicable.
 6. BICSI:
 - a. Telecommunications Distribution Methods Manual 12th Ed., or most recent revision at the time of installation.
 - b. Information Transport Systems Installation Methods Manual (ITSIMM), 5th Edition, or most recent revision at the time of installation. All parts unless otherwise required must be ROHS compliant.
- C. If there is a conflict between applicable documents, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents. The Contractor has the responsibility to determine and adhere to the most recent release when developing the proposal for installation.
- D. This document does not replace any code, either partially or wholly. The contractor must be aware of and comply with all local codes that may impact this project.

1.4 QUALITY ASSURANCE

- A. Quality Assurance: Contractors wishing to provide a proposal for this project are required to comply with the following without exception:
1. The winning Contractor will assign this project to a competent Project Manager who has demonstrated their ability to supervise a telecommunications project of the same size and scope.
 - a. The contractor will make this person available to the Owner/Owner's Representative before the start of this project for an interview. This person must be deemed acceptable by the Owner and/or their Representative before work can begin.
 - b. Project Manager will be required to be available for scheduled on site project meetings at no additional cost to the Owner.

- c. Project Manager will be required to be available to meet on site with the Owner/Owner's representative with a minimum of 24 hours notice for non-emergency issues, and a minimum of 4 hours for emergency issues at no additional cost to the Owner.
- 2. All material and equipment to be installed on this project will be new. If the Owner/Owner's Representative discovers that "used" material or equipment has been installed on this project the Contractor will be required to replace said materials and/or equipment with "new" products at no additional cost to the Owner.
 - a. "New" - Materials and products manufactured within one (1) year prior to installation, and meet or exceed the latest published specifications of the manufacture. Also these materials and equipment may not have been in use before installation on this project unless directed otherwise in the project documents.
- 3. Contractor will provide a minimum of a 25 year System Warranty as part of their bid price.
- 4. Contractor must warranty all materials, equipment and labor not covered under the 25 Year Certification Plus Warranty for a minimum of one (1) year.
 - a. Warranty will provide repair/replacement of all defective or improperly installed materials at no additional cost to the Owner (including Labor, drive time, shipping, taxes, etc.).
 - b. Contractor is required to keep in stock replacement parts for all items covered in this specification and provide a competent service technician to be on site to repair/replace defective items no later than 24hours after receiving trouble call.
 - c. Warranty will cover normal Business hours, 8am – 5pm, Monday thru Friday. All calls received on a Friday or the day before a holiday will be held until the following regular business day.

1.5 SUBMITTAL DOCUMENTATION

- A. Submittals shall comply with the Summary of Work document located in the Project Manual.
- B. Submit under provisions of Section 27 00 00.
- C. Product Data: Submittals shall include all items called for in this section and manufacturer's cut sheets for the following:
 - 1. All wire and cable: To include patch cords, cross connect wire and cross connect cordage.
 - 2. All connectors and required tooling.
 - 3. All termination system components for each cable type.
 - 4. All ER and TR equipment frame types, hardware and LAN equipment.
 - 5. All grounding and surge suppression system components.
 - 6. All test equipment to be used for fiber and copper channels.

1.6 EQUIVALENT PRODUCTS

- A. All Products described and Part Numbers given in this Specification are those of Panduit unless otherwise noted.

- B. Approved Equals:
1. Ortronics, Leviton & CommScope.
 2. Contractors wishing to approve a system other than those specified in this document will be required to perform the following:
 - a. Provide System specifications and cutsheets for all system components for the proposed new system(s).
 - b. Provide an itemized comparison to each of the system functions as described in this specification. Include in that document how the proposed system compares to the specified system described in this document on a line by line basis, using one of the following three criteria: "exceeds"/"matches"/ "unequal".
- C. All other products than those specifically address in the bid document that the Contractor is seeking approvals for must be *received* by the Owner's Representative *no later than 10 days before the bid date*. All Approved Equals will be published in addendum form prior to the bid date.
- D. Failure to received written approval for product installed that deviates from the products called for in this specification and/or on the project drawings will result in the contractor having to replace the unapproved materials and equipment with the originally specified products at no additional cost to the Owner.
- E. All proposed system documentation must be sent to the Owner's Representative via one of the following; mail, fax or email. The Contractor will include the project name, their contact information, and the specification section number that the proposed system is comparable to.

Infinity Communications and Consulting, Inc.
P.O. Box 999
Bakersfield, Ca. 93302
(661) 716-1840 Phone
(661) 716-1841 Fax
p2bids@infinitycomm.com Email

PART 2 - PRODUCTS

2.1 WORK AREA SUBSYSTEM

- A. The Work Area shall consist of the connectivity equipment used to connect the horizontal cabling subsystem and the equipment in the work area. The connectivity equipment shall include the following options:
1. Patch Cords.
 2. Modular Inserts and Jacks.
 3. Faceplates.
- B. Patch Cords:
1. Category 6 Data/Voice Outlet Patch Cords:
 - a. All category 6 channel patch cords shall be constructed with a snagless boot, made of molded PVC, colored matched to the color of the patch cord cable.
 - b. All category 6 channel patch cords shall be constructed with category 6 patch cable, 24 AWG, 7/32 tinned copper stranded patch cable, insulated with polyethylene and paired, jacketed with PVC, ETL Verified for ISO 11801, (UL) NEC type CM or CMR, 75° C, Article 800 CSA Type CMG.
 - c. All category 6 channel patch cords shall be 100% factory tested to pass return loss (RL) and near-end cross talk (NEXT).

- d. All category 6 channel patch cords shall be manufactured using a T568-B plug-wiring format.
- e. All patch cords will be delivered to the site and must be signed for by the Owner/Owner's Representative. It will be the responsibility of other to install all Work Area Data Patch Cords.
- f. Patch cords will be at least 16 feet long.
- g. Color: Data Patch Cords will be BLUE.
- h. Quantity: Contractor will provide one patch cord for every outlet cable shown on the drawings.
- i. Part#: UTPSP20BUY

C. Modular Inserts and Jacks:

- 1. Category 6 Data/Voice Jack:
 - a. Jack will meet the Category 6 Standard.
 - b. Jacks shall be 8 position un-keyed
 - c. Each jack shall be an individually constructed unit and shall snap mount in an industry standard keystone opening (.760" x .580")
 - d. Jacks shall utilize a 2 layer printed circuit board to control NEXT
 - e. Jack termination shall follow the industry standard 110 IDC.
 - f. Jacks shall have a designation indicating Category 6 on the nose which can be plainly seen from the front of the faceplate. Bottom of jack shall have date code and a abbreviated catalog number.
 - g. Jacks shall utilize a paired punch down sequence. Cable pair twists shall be maintained up to the IDC, terminating all conductors adjacent to its pair mate to better maintain pair characteristics designed by the cable manufacturer.
 - h. Jacks shall terminate 22-26 AWG stranded or solid conductors.
 - i. Jacks shall be compatible with single conductor 110 impact termination tools.
 - j. Jacks shall be compatible with TIA/EIA 606 color code labeling
 - k. Jacks shall have universal wiring designation.
 - l. Jacks shall have an attached color coded wiring instruction label housed between the IDC termination towers.
 - m. Jacks shall be manufactured in the USA
 - n. Jacks will be terminated according to the T568B wiring scheme.
 - o. Color:
 - 1) Data Jacks will be BLUE.
 - 2) Voice Jacks will be WHITE.
 - p. Quantity: Contractor will provide one jack for every outlet cable shown on the drawings.
 - q. Part#:
 - 1) Data Jack, CJ688TGBU.
 - 2) Voice Jack, CJ688TGWH.
- 2. Blank Insert:
 - a. Color: Blank Insert to be WHITE.
 - b. Quantity: Contractor will provide one insert for every video outlet cable shown on the drawings.
 - a. Panduit Part#: CMBWH-X.

D. Wall Mount and Modular Furniture Faceplates:

- 1. Voice/Data/Video Wall Plates
 - a. Faceplates shall be UL Listed and CSA Certified.
 - b. Faceplates shall be 2.75" W x 4.5" H (6A9.8 mm x 114.3 mm).
 - c. Faceplates shall provide for TIA/EIA 606 compliant station labeling.
 - d. Faceplates shall have plastic covers over the mounting screws that can be replaced with a clear plastic window over a printable paper insert.
 - b. Color: Faceplate to be WHITE.

- c. Quantity: Contractor will provide one single gang faceplate for each outlet shown on the drawings.

Part Number	Description
UICFP2WH	Single gang, vertical faceplate holds up to two Mini-Com Modules
UICFP4WH	Single gang, vertical faceplate holds up to four Mini-Com Modules
UICFP6WH	Single gang, vertical faceplate holds up to six Mini-Com Modules. Requires min. 1.9" wide in-wall box or wallboard adapter for proper installation

- 2. Blank Wall Plates:
 - a. Faceplate shall be constructed from stainless steel.
 - b. Faceplates shall be UL Listed and CSA Certified
 - c. Faceplates shall be 2.75" W x 4.5" H (6A9.8 mm x 114.3 mm) for single gang.
 - d. Color: Faceplate to be STAINLESS STEEL
 - b. Quantity: Contractor will provide one faceplate for each unused data/voice/video/intercom outlet shown on the drawings.
 - c. Part#: Equal to Hubbell Wiring Device, PN# S13
- 3. Surface Mount Raceway Insert: Inserts for Wiremold's 4050, 5450 and 5550 Device Mounting Brackets:
 - a. Insert shall allow for two category 6 jacks to be mounted flush.
 - b. Insert shall match the color of the Raceway installed.
 - c. Color: Faceplate to be IVORY
 - d. Quantity: Contractor will provide one 2port insert for each outlet in the Surface Mount Raceway shown on the drawings.
 - a. Part#: Equal to Wiremold, PN# 5507FRJ.

2.2 HORIZONTAL DISTRIBUTION CABLING

- A. The horizontal distribution cabling system is the portion of the telecommunications cabling system that extends from the Work Area (WA) telecommunications outlet/connector to the horizontal cross-connect in the Telecommunications Room
 - 1. Cabling Support System
 - 2. Copper Station Cabling
 - 3. Copper Cross-Connect Cabling
- B. Cabling Support System:
 - 1. See drawing plans and paragraph 2.4.F.
- C. Copper Station Cable:
 - 1. Category 6 Data/Voice Copper Unshielded Twisted Pair (UTP) Cable:
 - a. Cable will meet or exceed the proposed requirements of ANSI/TIA/EIA 568-B.2, 568-C.2 and ISO/IEC 11801 Category 6 Cable Standard for: NEXT and ELFEXT (Pair-To-Pair and Power Sum), Insertion Loss (Attenuation), Return Loss, and Delay Skew.
 - b. Cable shall be proven to support Gigabit Ethernet / 1000BASE-T / IEEE 802.3ab, ATM up to 155 Mbps, IEEE 802.3af Power Over Ethernet for VoIP, 100 Mbps Fast Ethernet / 100BASE-T / IEEE 802.3, ANSI.X3.263 FDDI TP-PMD, Ethernet / 10BASE-T / IEEE 802.3, 4 & 16 Mbps Token Ring / IEEE 802.5, T1/E1, xDSL, ISDN, 550 MHz Broadband Video and standards under development such as ATM at 622 Mbps, 1.2 and 2.4 Gbps.

- c. The cable shall consist of four unshielded twisted pairs of thermoplastic insulated bare copper enclosed in a thermoplastic jacket.
- d. All cable shall conform to the requirements for communications circuits defined by the National Electrical Code (Article 800) and the Canadian Building Code. Cable listed to NEC Article 800-51(a) will be used for "Plenum" installations. Cable listed to NEC Article 800-51(b) shall be installed in vertical runs penetrating more than one floor.
- e. Cable shall have been certified with the UL 1666 Vertical Tray Flame Test.
- f. Cable shall be available in a Plenum, Riser and Indoor/Outdoor rated jackets.
- g. Contractor will use the indoor/outdoor rated cable for all locations where the cable pathway goes underground and/or run in exterior conduit.
- h. The listed Category 6 cables in this specification are manufactured by General. All other manufactures eligible for Panduit's *Certification Plus* also have been pre-approved.
- i. Color:
 - 1) Data cable jacket will be BLUE
 - 2) Voice cable jacket will be WHITE
- j. Quantity: See Drawing for quantity and installation details.
- k. Part#:
 - 1) For Riser Application:
 - a) Data, General PN# 7133764.
 - b) Voice, General PN# 7133765.
 - 2) For Plenum Application:
 - a) Data, General PN# 7131760.
 - b) Voice, General PN# 7131761.
 - 3) For Outdoor Application:
 - a) Data/Voice/S-Video, General PN# 7136100 (all cable jackets will be BLACK).

D. Horizontal Copper Cross-Connect Cabling:

- 1. Data Cross-Connect Cabling:
 - a. Cable shall meet and/or exceed the UL Listed Type CMR and the ANSI/TIA/EIA 568C.1 standard for Category 6 compliance.
 - b. Core Construction
 - 1) Conductors: Solid-copper conductors, 23 AWG.
 - 2) Insulation: Polyolefin.
 - c. Jacket: Gray, Non-Plenum PVC jacket.
 - d. Color: Data cable jacket will be GRAY.
 - e. Quantity: Will be equal to the number of jacks installed.
 - f. Part#: Equal to General Cable, PN# 7133821.
- 2. Voice Cross-Connect Cabling:
 - a. Cable shall meet and/or exceed the UL Listed Type CMR and the ANSI/ICEA S-80-576A standard.
 - b. Core Construction:
 - 1) Conductors: Solid-copper conductors, 24 AWG.
 - 2) Insulation: Flame retardant semi-rigid PVC.
 - 3) Core Assembly: Cable core will be made up of 100 pair units consisting of four (4) 25 pair sub-units. Each group individually identifiable by color coded unit binders.
 - c. Jacket: Gray, flame retardant PVC jacket.
 - d. Color: Voice cable jacket will be GRAY
 - e. Quantity: See Drawing for quantity and installation details. The number of 25-pair cable between the MDF and the IDF shall be

derived by multiplying the number of pairs required for the cross-connect by 1.25 to the nearest 25-pair increment.

- f. Part#: Equal to General Cable:
- 1) 25 pair = PN# 6A97006A5.
 - 2) 50 pair = PN# 6A970123.
 - 3) 75 pair = PN# 7002975.
 - 4) 100 pair = PN# 700296A7.

2.3 BACKBONE CABLING

- A. The backbone cabling system is the portion of the telecommunications cabling system that extends from the Intermediate Distribution Frame (IDF) to the Main Distribution Frame (MDF).
1. Fiber Optic Backbone Cabling are existing.
 2. Copper Backbone Cabling are existing.
- B. Copper System Backbone Cabling:
1. Voice/Intercom/Bell System Backbone Cabling are existing to remain.

2.4 TELECOMMUNICATION ROOM

- A. The Telecommunication Room (TR) includes those products that terminate horizontal and backbone cabling subsystems and connect them to the network equipment.
1. Patch Cords.
 2. Horizontal Cabling Termination Equipment.
 3. Backbone Cabling Termination Equipment.
 4. Cabinets, Racks, and Enclosures.
 5. Cable Support System.
 6. Grounding and Bonding Equipment.
- B. Patch Cords:
1. Copper Patch Cords: Category 6 Data/Voice TR Patch Cords:
 - a. TR Copper Patch Cords shall comply with those specified in 2.1 *Work Area Subsystem, A. Patch Cords, 1. Category 6 Data Outlet Patch Cords.*
 - b. *All patch cords will be delivered to the site and must be signed for by the Owner/Owner's Representative. It will be the responsibility of other to install all TR Data and Voice Patch Cords.*
 - c. Color:
 - 1) Data Patch Cords will be BLUE
 - 2) Voice Patch Cords will be WHITE
 - d. Quantity: Contractor will provide one patch cord for every data and voice outlet cable shown on the drawings. Contractor will provide the quantity of different length patch cords as follows:
For the HC's, Contractor will provide:
 - 1) All patch cords will be 3ft.
 - e. Part#:
 - 1) Data Patch Cords: 3 foot Data Patch Cord, UTPSP3BUY.
 - 2) Voice Patch Cords: 3 foot Voice Patch Cord, UTPSP3BUY.
 2. Fiber Patch Cords: Fiber Optic TR Patch Cords:
 - a. Patch Cords shall be a Duplex SC to SC 50/125µm "Laser Optimize" Graded-Index Multimode Fiber Patch Cord.
 - b. All patch cords shall be factory polished and 100% optically tested for superior performance.

- c. Cables shall have a Mated Pair MM Insertion Loss of less than 0.6A0 dB (0.25 dB Typical).
- d. Cable Retention: > 25 pounds
- e. All optical, mechanical and environmental performance shall meet and/or exceed the TIA/EIA-56A8-C.3 specifications.
- f. Fiber patch cords will be 1 meter long.
- g. Color: NA.
- b. Quantity: Contractor will provide two fiber patch cords for every TR shown on the drawings.

Panduit Part Number	Description
FXD3-3M1Y	SC to SC multimode duplex patch cord, 3mm jacketed cable (one duplex SC connector on each end) – 10Gig™ 50/125µm.

C. Horizontal Cable Termination Equipment:

1. Copper Termination Equipment: Data/Voice Category 6 Patch Panels:
 - a. Panels shall be made of black anodized aluminum in 24, 48, and 96 port configurations.
 - b. Panels shall have modular jacks employing a tri-plane staggered contact array with a flat "hairpin" contact design made of Beryllium copper with a minimum 50-micro-inch gold plating on contact surfaces over 50-100 micro-inch of nickel compliant with FCC part 68.
 - c. Panels shall be equipped with 110-style termination made of fire retardant UL 94V0 rated thermoplastic and tin lead solder plated IDC.
 - d. Panels shall have optional rear cable support bar for strain relief. Cable support bar shall attach to the rear of the patch panel itself without the use of additional fasteners or screws.
 - e. Panels shall have self-adhesive, clear label holders and white designation labels provided with the panel for each row of 24 ports.
 - f. Panels shall provide wiring identification & color code and maintain an in-line, paired punch down sequence that does not require the splitting of conductors from individual cable pairs.
 - g. Panels shall terminate 22-26 AWG solid conductors, maximum insulated conductor outside diameter 0.050".
 - h. Panels shall be ANSI/TIA/EIA-568-C.1, C.2 and ISO/IEC 11801 category 6 compliant.
 - i. Panels shall be UL LISTED 1863 and CSA certified.
 - j. Panels shall be made by an ISO 9002 Certified Manufacturer.
 - k. Panels installed in a 4-connector channel with a category 6 modular jack, and category 6 patch cords, all from the same manufacturer, and a qualified category 6 cables shall meet or exceed the requirements of Draft 5 of the TIA UTP Systems Task Group PN3727, Category 6 Draft Addendum to the ANSI/TIA/EIA-568-C.2 standard.
 - l. Color: Patch Panel shall be BLACK.
 - m. Quantity: See Drawing for quantity and installation details. The number of patch panels to be supplied shall be derived by multiplying the number of data/voice cables being terminated at the individual TR by 1.25 and providing additional panels in the nearest 24 port increment.
 - n. Part#:
 - 1) 24 port Category 6 Patch Panel, DP24688TGY.
 - 2) 48 port Category 6 Patch Panel, DP24688TGY.

**Provide one Cable Management Bar, PN# CMPHF2, for each patch panel.*

2. Copper Termination Panels:

a. Voice/Intercom 110 Wiring Blocks:

- 1) Blocks shall be available in a 300 pair unit.
- 2) Blocks shall be wall mounted.
- 3) Wiring blocks shall be available as kits that include the wiring blocks, the proper number of 5 pair connecting clips, wire management and label strips.
- 4) Blocks shall be constructed of a UL94 V0 rated polycarbonate blend.
- 5) Blocks shall be mounted to a rugged 16 ga steel distribution frame. Frame shall support the 110 blocks and allow for a through for cables to be routed through the rear of the blocks directly to the termination point.
- 6) Blocks shall be UL VERIFIED for TIA/EIA-568-C compliance.
- 7) Color: NA
- 8) Quantity: See Drawing for quantity and installation details. The number of 110 blocks to be supplied shall be derived by multiplying the number of voice/intercom cables being terminated at the individual TR by 1.25 and providing additional panels in the nearest 300 pair block increment.

Panduit Part Number	Description
P110B1004R4WJY	Two 100-pair bases and jumper troughs premounted to 19" rack mount panel. 4-pair connector kit included with five 4-pair connectors and one 5-pair connector per row of 25 pairs.

3. OSP Protection Panels:

- a. 110 connector input and output.
- b. Wall or frame mountable.
- c. Designed with an internal splice chamber and cover over incoming and outgoing connections and protection modules.
- d. Stackable to allow for future service expansion.
- e. Equipped with an internal fuse link.
- f. External ground connectors accept 6-14 AWG ground wire.
- g. Accommodates industry standard 5 pin protection modules.
- h. Designed to exceed the requirements set forth in Underwriters Laboratory's UL497.
- i. Color: NA
- j. Quantity: See Drawing for quantity and installation details.
- k. Part#: Circa Enterprise Inc.
25 pair block, PN# 1880ECA1-25
50 pair block, PN# 1880ECA1-50
100 pair block, PN# 1880ECA1-100

4. OSP Protection Fuse's:

- a. 75VDC (RUS Approved).
- b. Nanosecond response time.
- c. External failsafe mechanism that permanently carbon arrestors grounds the module under sustained high current conditions.
- d. Integrated Test Points.
- e. UL & cUL listed.
- f. Designed to meet or exceed Telcordia standards.
- g. ISO 9002 Certified Manufacturer.
- h. Color: RED.
- i. Quantity: See Drawing for quantity and installation details.
- j. Part#: Circa Enterprise inc. 4B3S-75:
**Provide 100% fuse density for all installed Protection Panels.*

D. Cable Support System:

1. Ladder Rack Cable Runway:

- a. Stringers shall be fabricated from 16Aga 0.375" x 1.5" Cold Rolled Steel tubing.
- a. Rungs shall be fabricated from 16Aga 0.5" x 1.0" Cold Rolled Steel tubing.
- b. Rungs shall be spaced at 9.0" center to center.
- c. A straight length of ladder shall be capable of supporting 45 pounds per foot when a 10' length is tested according to NEMA VE-1.
- d. Ladder Rack shall have a powder coat finished.
- e. Ladder Rack shall be available in standard 6ft. and 10ft. lengths.
- f. Ladder rack shall be a part of a total system that includes: manufacture bends, wall supports, joining hardware, etc.
- g. Ladder Rack shall be grounding per the TIA/EIA 6A07-A.
- h. Color: Ladder Rack will be BLACK.
- i. Quantity: See Drawing for quantity and installation details.
- j. Part #: Equal to Chatsworth Products Cable Raceway, PN# 11252-71X.

E. Firestop System:

1. See project drawings for detailed fire caulk systems and products.
2. Intumescent fire caulk:
 - a. The firestop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure.
 - b. Firestop systems comprise an effective block for fire, smoke, heat, vapor and pressurized water stream.
 - c. All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate firestop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall use the proper firestop equipment.
 - d. Firestop systems shall be UL Classified to ASTM E814 (UL 1479).
 - e. Approved Fire Barrier/Caulk – 3M Fire Barrier CP25 or equal STI, PN# SSS100.

F. Re-Enterable Fire Stop System:

1. See project drawings for detailed fire thru systems and products.
 - a. The re-enterable fire stop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure.
 - b. No additional fire stopping material shall be required to obtain proper fire stopping.
 - c. The system shall offer full fire resistance whether it is empty or 100% visually filled.
 - d. The system shall be self-contained, and shall automatically adjust to differing cable loads.
 - e. The system shall allow add, moves, and changes without additional materials.
 - f. All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate re-enterable fire stop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and

- sleeves, cables, conduit, cable tray, and raceways, etc. shall use the proper fire stop equipment.
- g. Fire stop systems shall be UL Classified to ASTM E814 (UL 1479).
- h. The system shall be gang-able using wall plates for additional capacity.
- i. Quantity: See Drawing for quantity and installation details.
- j. Part #: Equal to STI
 - 1) STI PN# EZDP33FWS.
 - 2) STI PN# EZDP33WR.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Work Area Outlets Installation:
 - 1. No more than 12" of cable shall be stored in an outlet box, modular furniture raceway, or insulated walls.
 - 2. Bend radius of the cable in the termination area shall not be less than 4 times the outside diameter of the cable.
 - 3. The cable jacket shall be maintained to within 12.7mm (1/2 inch) of the termination point.
 - 4. All UTP cables shall have no more than 12.7mm (1/2 inch) of pair *untwisted* at the termination point.
 - 5. Data jacks, unless otherwise noted in drawings, shall be located in the top position(s) of each faceplate. Data jacks in horizontally oriented faceplates shall occupy the left-most position(s).
 - 6. Voice jacks, unless otherwise noted in drawings, shall occupy the next position(s) below the data on the faceplate. Voice jacks in horizontally oriented faceplates shall occupy the position left of the data jack.
 - 7. Video jacks, unless otherwise noted in drawings, shall occupy the bottom position(s) on the faceplate. Video jacks in horizontally oriented faceplates shall occupy the position left of the data/voice jack.
 - 8. All faceplates installed shall be level.
 - 9. All outlets will be labeled according to the approved labeling scheme.
 - 10. Each faceplate shall be machine labeled. The labeling shall be placed on the faceplate so that the individual jack can be clearly identified by its associated label.
 - 11. Cables shall be identified by a self-adhesive label in accordance with the Identification and Labeling section of this specification and ANSI/TIA/EIA-606A. The cable label shall be applied to the cable no further than 6" behind termination module, behind the faceplate on a section of cable that can be accessed by removing the cover plate.
- B. Horizontal Distribution Cable Installation:
 - 1. Cable shall be installed in accordance with manufacturer's recommendations and best industry practices.
 - 2. Tie Wraps will not be allowed for supporting, bundling and/or dressing of any station cables on this project.
 - 3. Contractor will provide a three foot "service loop" for all station cables. The service loop will be coiled and secured using Velcro in the accessible ceiling at the conduit stub to the work area outlet box.
 - 4. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in all "common" conduit runs. "Common" Conduit Runs are those that house more than one cable or set of cables that do not specifically feed a Work Station Outlet. Examples of "Common" Conduit Runs are: floor/ceiling penetrations, stub-throughs, distribution conduits, all conduits between J-boxes, etc.

5. Cable raceways shall not be filled greater than the TIA/EIA-56A9-A maximum fill for the particular raceway type or 40%.
6. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.
7. The cable's minimum bend radius and maximum pulling tension shall not be exceeded.
8. Pulling tension on 4-pair UTP cables shall not exceed 25-lb for a four-pair UTP cable.
9. The Cable Support System shall be installed in such away that will allow for future cables to be added and to provide sufficient protection of all cable.
10. For all installs where station cables are not installed in a continuous conduit run the following guidelines will apply. The Contractor will be responsible to reinstall all cables and pathways that do not meet with the following at no additional cost to the Owner:
11. J-hooks shall be installed to support all station cables every 4ft to 5ft.
12. All pathways shall be run at right angles. No diagonal pathways will be allowed unless otherwise noted on the drawings.
13. Horizontal cables shall be bundled in groups of no more than 25 cables per Caddy's CAT21 J-hook, no more than 40 cables per Caddy's CAT32 J-hook, and no more than 6A4 cables per Caddy's CAT6A4 J-hook.
14. At no point shall cable(s) rest on acoustic ceiling grids, acoustic panels, or lighting fixtures.
15. All cables will be installed so that there is a minimum of 3" of clearance above all ceiling grid and tiles.
16. All cables will be installed so that there is a minimum of 12" of clearance above all florescent lighting.
17. All cables will be installed so that there is a minimum of 6A" of clearance from all fire alarm and electrical system conduits.
18. Cables shall not be attached to the ceiling grid or lighting fixture wires. The contractor will provide their own carriers wires to support their horizontal cabling.
19. All cables shall be installed above fire-sprinkler systems and plumbing system fixtures and devises. Cables shall not be attached to or supported by these fixtures and/or their ancillary equipment or hardware.
20. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.
21. Contractor is responsible for sealing around all cables that penetrate fire rated barriers.
22. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.

C. Horizontal Cross-Connect Installation:

1. Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-A standard, manufacturer's recommendations and best industry practices.
2. The cable jacket shall be maintained to within 12.7mm (1/2 inch) of the termination point.
3. All UTP cables shall have no more than 12.7mm (1/2 inch) of pair *untwist* at the termination point.
4. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.
5. All cables shall be neatly bundled and dressed continuously from the entrance point of the Telecommunications Room to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame. Contractor will use Velcro strip to bundle cables together. The use of Tie - Wraps is not permitted.

6. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

D. Backbone Cable Installation:

1. Backbone cables shall be installed separately from horizontal distribution cables.
2. Where possible the backbone and horizontal cables shall be installed in separate conduits.
3. Where possible backbone cables of the same type shall be combined in conduit runs to maximize conduit fill ratios.
4. Where backbone cables and distribution cables are installed in a cable tray or wireway, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.
5. Pulling tension on Backbone cables shall not exceed the manufacture's limitations.
6. The minimum bend radius for all Backbone cables is 16 times the cable diameter or the manufactures specification, whichever is greater.
7. All OSP cables may not penetrate more than 50ft into the buildings before be terminated or splices to cable with a fire resistant jacket, unless the jacket is indoor/outdoor rated.
8. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.
9. All backbone cables shall be securely fastened to the sidewall of the TR on each floor.
10. Backbone cables spanning more than three floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes.
11. Vertical runs of cable shall be supported to messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.
12. Large bundles of cables and/or heavy cables shall be attached using metal clamps and/or metal banding to support the cables.

E. Backbone Cross-Connect Installation:

1. Cables shall be dressed and terminated in accordance with the recommendations made in the TIA/EIA-568-A document, manufacturer's recommendations and best industry practices.
2. Bend radius of the cable in the termination area shall not exceed 16A times the outside diameter of the cable.
3. All cables shall be neatly bundled and dressed continuously from the entrance point of the Telecommunications Room to their respective panels or blocks.
4. Contractor will provide a minimum of a 3 foot "service loop" for each backbone cable before terminating to allow future rearrangement. Cables will be coiled and secured above the ceiling where possible or to the Telco Backboard where entrance point is from the floor.
5. Wall mounted termination block fields shall be installed with the lowest edge of the mounting frame 18" from the finished floor.
6. Contractor shall provide a machine label 1ft. to 2ft. from the entrance point of the TR and 6in. to 12in. from the termination point on each backbone cable. Cable shall be easily identified and fully legible without removing the bundle support ties.

F. Cabinets, Racks, Enclosures and Ladder Rack Installation:

1. Wall Mount Racks/Cabinets shall be securely attached to the Telco Backboard using minimum 5/16" hardware or as required by local codes.
2. Floor Mount Racks/Cabinets shall be securely attached to the concrete floor using minimum 3/8" drop-in anchor hardware or as required by local codes.

3. All Floor Mount Racks/Cabinets will be either; secured on one side to the wall or attached to the closest wall with ladder rack.
4. All Racks/Cabinets shall be braced to meet Zone 4 seismic requirements.
5. Contractor will maintain a minimum of 36 inches of clearance from the front of the all rack/cabinets and all other obstructions.
6. Floor Mount Racks/Cabinets shall be installed to allow for a minimum of 36A" from rear and all other obstructions.
7. All racks shall be grounded to the telecommunications ground bus bar.
8. Rack mount screws not used for installing patch panels and other hardware shall be bagged and left with the rack upon completion of the installation.
9. The plywood bottom edge shall be mounted vertically no less than 12" above the finished floor.
10. Contractor will provide all cutouts for the Electrical Contractors expansion rings and electric receptacles as shown on the drawings.
11. Ladder Rack must be securely attached to walls, backboards, and racks/cabinets to comply with all Zone 4 seismic requirements.
12. Ladder rack shall be installed so that there is a minimum of 8" of unobstructed clearance above rack.
13. Ladder Rack shall be installed so that there is a minimum of 12" of clearance from all: florescent lighting, electrical conduits/circuits, and fire alarm conduits/devices.

G. Firestop System:

1. The firestop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure.
2. Firestop systems comprise an effective block for fire, smoke, heat, vapor and pressurized water stream.
3. All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate firestop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall use the proper firestop equipment.
4. Firestop systems shall be UL Classified to ASTM E814 (UL 1479).

3.2 IDENTIFICATION AND LABELING

- A. The contractor shall develop and submit for approval a labeling system for the cable installation. The Owner will negotiate an appropriate labeling scheme with the successful contractor.
- B. The approved system will comply with the TIA/EIA -606-A Class 2 designations and include at a minimum, identifiers for all major components of the system: telecommunication rooms, grounding bus bars, racks, cables, panels and outlets. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure.
- C. All label printing will be machine generated or hand-held printers using indelible ink ribbons or cartridges. Self-laminating labels will be used on cable jackets, appropriately sized to the OD of the cable, and placed within view at the termination point on each end. Outlet, patch panel and wiring block labels shall be installed on, or in, the space provided on the device.
- D. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.

3.3 TESTING AND ACCEPTANCE

A. General:

1. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568-A Addendum 5, TSB-67 and TSB-95. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.
2. All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards, the Manufacturer's Warranty guidelines and best industry practice. If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.
3. Contractor will notify the Owner/Owner's Representative 72 hours before commencement of testing.
4. Upon receipt of the test documentation, the Customer reserves the right to have the contractor perform a 10% witnessed "spot testing" of the cabling system to validate test results provided in the test document, at no additional cost. If a significant amount of cables are marginal and/or fail during the "spot test" Contractor will retest the entire cable plant at no additional cost.

B. Copper Cable Testing:

1. Twisted Pair Cable:

- a. All twisted-pair copper cable links (including backbone cables) shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below.
- b. Continuity: Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. Shielded/screened cables shall be tested with a device that verifies shield continuity in addition to the above stated tests. The test shall be recorded as pass/fail as indicated by the test unit in accordance with the manufacturers' recommended procedures, and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.
- c. Length: Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA/EIA-568-A Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.

2. Category 6 Performance:

- a. Follow the Standards requirements established in:
 - 1) ANSI/TIA/EIA-568-A -TSB-67:
 - a) Wire Map.
 - b) Length.
 - c) Attenuation.
 - d) NEXT (Near end crosstalk).
 - 2) ANSI/TIA/EIA-568-A -TSB-95:
 - a) Return Loss.
 - b) ELFEXT Loss.
 - c) Propagation Delay.

- d) Delay skew.
 - 3) ANSI/TIA/EIA-568-A, Amendment 5:
 - a) PSNEXT (Power sum near-end crosstalk loss).
 - b) PSELFEXT (Power sum equal level far-end crosstalk loss)
- b. A Level III or better test unit is required to verify category 6 performances and must be updated to include the requirements of TSB-95 and Amendment 5. Testers will be equal to Fluke Network's DXT CableAnalyzer™ Series.
- c. All testers shall have been recalibrated with 6 months of use on this project. Contractor will be asked to provide proof of recalibration.
- d. Test results shall be automatically evaluated by the equipment, using the most up-to-date criteria from the TIA/EIA Standard, and the result shown as pass/fail. The approved Level Three tester shall provide a printed document for each test that is also available in a downloadable file using an application from the test equipment manufacturer. The printed test results shall include a print out of all tests performed, and the individual test results for each cable.

3.4 SYSTEM CLOSEOUT AND AS BUILT DOCUMENTATION

- A. Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets to the Owner's Representative/Engineer for approval. One (1) to be a hardcopy and two (2) to be electronic copies. Documentation shall include the items detailed in the sub-sections below.
- B. Documentation shall be submitted within ten (10) working days of the completion of each testing phase. This is inclusive of all test results and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 calendar days of the completion of each testing phase. At the request of the Owner's Representative/Engineer, the telecommunications contractor shall provide copies of the original test results.
- C. The Owner's Representative/Engineer will request that a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.
- D. Test Results documentation shall be provided in two media, as listed above, one (1) hardcopy and one (1) on disk within three weeks after the completion of the project. The documentation shall be clearly marked on the outside front cover with the words "Project Test Documentation", the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, an bi-annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.
- E. Printouts generated for each cable by the wire test instrument shall be submitted as part of the documentation package.

- F. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.
- G. The As-Built drawings are to include cable routes, outlet locations and the approved labeling identifiers. Their sequential number as defined elsewhere in this document shall identify outlet locations. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The Owner will provide floor plans in paper and electronic (DWG, AutoCAD 2008) formats on which as-built construction information can be added. These documents will be modified accordingly by the telecommunications contractor to denote as-built information as defined above and returned to the Owner.
- H. Contractor will provide one laminated 11"x17" drawing at each Telecommunications Room (TR) that includes the building layout for that HC/MC, along with the outlet locations and all of the approved labeling.

END OF SECTION

06/08/18

SECTION 28 31 00

FIRE ALARM SYSTEM

PART 1 – GENERAL

1.1. SUMMARY

- A. This Section covers fire alarm systems, including initiating devices, audible and visible notification appliances, controls, supervisory devices and complete voice evacuation system. The new devices shall be connected into the existing fire alarm system manufactured by Siemens.
- B. Work covered by this section includes the furnishing of labor, equipment, and materials for installation of the fire alarm system as indicated on the drawings and specifications.
- C. The Fire Alarm System shall consist of all necessary hardware equipment and software programming to perform the following functions:
 - 1. Fire alarm and detection operations.
 - 2. Control and monitoring of elevators, smoke control equipment, door hold-open devices, fire suppression systems, emergency power systems, and other equipment as indicated in the drawings and specifications.

1.2. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specification Sections, apply to this section.
- B. The work covered by this section is to be coordinated with related work as specified elsewhere in the specifications. Requirements of the following sections apply:
 - 1. Division 21: "Fire Suppression"
 - 2. Division 26: "Electrical"
 - 3. Division 27: "Communications."
 - 4. Division 25: "Heating, Ventilating, and Air Conditioning"
- C. The system and all associated operations shall be in accordance with the following:
 - 1. California Building Code: CBC.
 - 2. NFPA 72, National Fire Alarm Code, 2016 Edition as amended.
 - 3. California Electrical Code, 2016 Edition as amended.
 - 4. NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems.
 - 5. Other applicable NFPA standards.

6. Local Jurisdictional Adopted Codes and Standards.
7. ADA Accessibility Guidelines.

1.3. SYSTEM DESCRIPTION

- A. General: Provide a complete, non-coded, addressable/conventional, microprocessor-based fire alarm system with initiating devices, notification appliances, and monitoring and control devices as indicated on the drawings and as specified herein.
- B. Software: The fire alarm system shall allow for loading and editing instructions and operating sequences as necessary. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control unit. Loss of primary and secondary power shall not erase the instructions stored in memory. System shall be capable of storing dual configuration programs with one active and one in reserve. Panel shall be capable of full system operation during a new configuration download.
- C. History Logs: The system shall provide a means to recall alarms and trouble conditions in chronological order for the purpose of recreating an event history. A separate alarm and trouble log shall be provided.
- D. Recording of Events: Record all alarm, supervisory, and trouble events by means of system printer. The printout shall include the type of signal (alarm, supervisory, or trouble) the device identification, date and time of the occurrence. The printout differentiates alarm signals from all other printed indications.
- E. Wiring/Signal Transmission:
 1. Transmission shall be hard-wired, using separate individual circuits for each zone of alarm operation as required or addressable signal transmission, dedicated to fire alarm service only.
 2. System connections for initiating (signaling) circuits and notification appliance circuits shall be Class B.
 3. Circuit Supervision: Circuit faults shall be indicated by a trouble signal at the FACP. Provide a distinctive indicating audible tone and alphanumeric annunciation.
- F. Remote Access:
 1. A personal computer or technician's laptop, configured with terminal emulation software shall have the ability to access the FACP for diagnostics, maintenance reporting and information gathering.
 2. FACP shall have the capability to provide Remote Access through a listed Internet Interface via a standard web browser user interface.
- G. Required Functions: The following are required system functions and operating features:
 1. Priority of Signals: Alarm events have highest priority. Subsequent alarm events are queued in the order received and do not affect existing alarm conditions. Priority Two, Supervisory and Trouble events have second-, third-, and fourth-level priority respectively. Signals of a higher-level priority take precedence over signals of lower priority even though the lower-priority

condition occurred first. Annunciate all events regardless of priority or order received.

2. Non interfering: An event on one zone does not prevent the receipt of signals from any other zone. All zones are manually resettable from the FACP after the initiating device or devices are restored to normal. The activation of an addressable device does not prevent the receipt of signals from subsequent activations.
3. Transmission to Remote Central Station: Automatically route alarm, supervisory, and trouble signals to a remote central station service transmitter provided under another contract.
4. Annunciation: Operation of alarm and supervisory initiating devices shall be annunciated at the FACP and the remote annunciator, indicating the location and type of device.
5. General Alarm: A system general alarm shall include:
 - a) Indication of alarm condition at the FACP and annunciator(s).
 - b) Identification of the device or zone that is the source of the alarm at the FACP.
 - c) Operation of audible and visible notification devices throughout the building until silenced at FACP.
 - d) Closing doors normally held open by magnetic door holders.
 - e) Unlocking designated doors.
 - f) Shutting down supply and return fans serving zone where alarm is initiated.
 - g) Closing smoke dampers on system serving zone where alarm is initiated.
 - h) Initiation of smoke control sequence through the building temperature control system.
 - i) Notifying the local fire department.
 - j) Initiation of elevator recall in accordance with ASME/ANSI A17.1, when specified detectors or sensors are activated.
6. Supervisory Operations: Upon activation of a supervisory device such as fire pump power failure, low air pressure switch, and tamper switch, the system shall operate as follows:
 - a) Activate the system supervisory service audible signal and illuminate the LED at the control unit and the graphic annunciator.
 - b) Pressing the Supervisory Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition.
 - c) Record the event in the FACP historical log.

- d) Transmission of supervisory signal to remote central station.
 - e) Restoring the condition shall cause the Supervisory LED to clear and restore the system to normal.
7. Alarm Silencing: If the "Alarm Silence" button is pressed, all audible alarm signals shall cease operation.
8. System Reset:
- a) The "System Reset" button shall be used to return the system to its normal state. Display messages shall provide operator assurance of the sequential steps ("IN PROGRESS", "RESET COMPLETED") as they occur. The system shall verify all circuits or devices are restored prior to resetting the system to avoid the potential for re-arming the system. The display message shall indicate "ALARM PRESENT, SYSTEM RESET ABORTED."
 - b) Should an alarm condition continue, the system will remain in an alarmed state.
9. A manual evacuation (drill) switch shall be provided to operate the notification appliances without causing other control circuits to be activated.
10. WALKTEST: The system shall have the capacity of 8 programmable pass code protected one person testing groups, such that only a portion of the system need be disabled during testing. The actuation of the "enable one person test" program at the control unit shall activate the "One Person Testing" mode of the system as follows:
- a) The city circuit connection and suppression release circuits shall be bypassed for the testing group.
 - b) Control relay functions associated to one of the 8 testing groups shall be bypassed.
 - c) The control unit shall indicate a trouble condition.
 - d) The alarm activation of any initiation device in the testing group shall cause the audible notification appliances to sound to identify the device or zone.
 - e) The unit shall automatically reset itself after signaling is complete.
 - f) Any momentary opening of an initiating or notification appliance circuit wiring shall cause the audible signals to sound for 4 seconds indicating the trouble condition.

H. Analog Smoke Sensors:

- 1. Monitoring: FACP shall individually monitor sensors for calibration, sensitivity, and alarm condition, and shall individually adjust for sensitivity. The control unit shall determine the condition of each sensor by comparing the sensor value to the stored values.
- 2. Environmental Compensation: The FACP shall maintain a moving average of the sensor's smoke chamber value to automatically compensate for dust, dirt, and other conditions that could affect detection operations.

3. Programmable Sensitivity: Photoelectric Smoke Sensors shall have 7 sensitivity levels ranging from 0.2% to 3.7%, programmed and monitored from the FACP.
4. Sensitivity Testing Reports: The FACP shall provide sensor reports that meet NFPA 72 calibrated test method requirements. The reports shall be viewed on a CRT Display or printed for annual recording and logging of the calibration maintenance schedule.
5. The FACP shall automatically indicate when an individual sensor needs cleaning. The system shall provide a means to indicate that a sensor requires cleaning. When a sensor's average value reaches a predetermined value, (3) progressive levels of reporting are provided. The first level shall indicate that a sensor is close to a trouble reporting condition and will be indicated on the FACP as "ALMOST DIRTY." This condition provides a means to alert maintenance staff of a dirty sensor without creating a trouble in the system. If this indicator is ignored, a second level "DIRTY SENSOR" condition shall be indicated at the FACP and subsequently a system trouble is reported to the Central Monitoring Station. The sensor base LED shall glow steady giving a visible indication at the sensor location. The "DIRTY SENSOR" condition shall not affect the sensitivity level required to alarm the sensor. If a "DIRTY SENSOR" is left unattended, and its average value increases to a third predetermined value, an "EXCESSIVELY DIRTY SENSOR" trouble condition shall be indicated at the control unit.
6. The FACP shall continuously perform an automatic self-test on each sensor which will check sensor electronics and ensure the accuracy of the values being transmitted. Any sensor that fails this test shall indicate a "SELF TEST ABNORMAL" trouble condition.
7. Multi-Sensors shall combine photoelectric smoke sensing and heat sensing technologies. An alarm shall be determined by either smoke detection, with selectable sensitivity from 0.2 to 3.7 %/ft obscuration; or heat detection, selectable as fixed temperature or fixed with selectable rate-of-rise; or based on an analysis of the combination of smoke and heat activity.
8. Programmable bases. It shall be possible to program relay and sounder bases to operate independently of their associated sensor.
9. Magnet test activation of smoke sensors shall be distinguished by its label and history log entry as being activated by a magnet.
- I. Smoke Detectors: A maintenance and testing service providing the following shall be included with the base bid:
 1. Biannual sensitivity reading and logging for each smoke sensor.
 2. Scheduled biannual threshold adjustments to maintain proper sensitivity for each smoke sensor.
 3. Threshold adjustment to any smoke sensor that has alarmed the system without the presence of particles of combustion.
 4. Scheduled biannual cleaning or replacement of each smoke detector or sensor within the system.
 5. Semi-annual functional testing of each smoke detector or sensor using the manufacturer's calibrated test tool.

6. Written documentation of all testing, cleaning, replacing, threshold adjustment, and sensitivity reading for each smoke detector or sensor device within the system.
 7. The initial service included in the bid price shall provide the above listed procedures for a period of five years after owner acceptance of the system.
- J. Audible Alarm Notification: By speaker signals in areas as indicated on drawings.
- K. Fire Suppression Monitoring:
1. Water flow: Activation of a water flow switch shall initiate general alarm operations.
 2. Sprinkler valve tamper switch: The activation of any valve tamper switch shall activate system supervisory operations.
 3. WSO: Water flow switch and sprinkler valve tamper switch shall be capable of existing on the same initiating zone. Activation of either device shall distinctly report which device is in alarm on the initiating zone.
- L. Power Requirements:
1. The control unit shall receive AC power via a dedicated fused disconnect circuit.
 2. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal AC power in a normal supervisory mode for a period of 24 hours with 15 minutes of alarm operation at the end of this period. The system shall automatically transfer to battery standby upon power failure. All battery charging and recharging operations shall be automatic.
 3. All circuits requiring system-operating power shall be 24 VDC and shall be individually fused at the control unit.
 4. The incoming power to the system shall be supervised so that any power failure will be indicated at the control unit. A green "power on" LED shall be displayed continuously while incoming power is present.
 5. The system batteries shall be supervised so that a low battery or depleted battery condition or disconnection of the battery shall be indicated at the control unit and displayed for the specific fault type.
 6. The system shall support NAC Lockout feature to prevent subsequent activation of Notification Appliance Circuits after a Depleted Battery condition occurs in order to make use of battery reserve for front panel annunciation and control
 7. The system shall support 100% of addressable devices in alarm or operated at the same time, under both primary (AC) and secondary (battery) power conditions.
 8. Loss of primary power shall sound a trouble signal at the FACP. FACP shall indicate when the system is operating on an alternate power supply.

1.4. SUBMITTALS

- A. General: Submit the following according to Conditions of Contract and Division 1 Specification Sections.
1. Product data sheets for system components highlighted to indicate the specific products, features, or functions required to meet this specification. Alternate or as-equal products submitted under this contract must provide a detailed line-by-line comparison of how the submitted product meets, exceeds, or does not comply with this specification.
 2. Wiring diagrams from manufacturer.
 3. Shop drawings showing system details including location of FACP, all devices, circuiting and details of graphic annunciator.
 4. System Power and battery charts with performance graphs and voltage drop calculations to assure that the system will operate per the prescribed backup time periods and under all voltage conditions per UL and NFPA standards.
 5. System operation description including method of operation and supervision of each type of circuit and sequence of operations for all manually and automatically initiated system inputs and outputs. A list of all input and output points in the system shall be provided with a label indicating location or use of IDC, NAC, relay, sensor, and auxiliary control circuits.
 6. Operating instructions for FACP.
 7. Operation and maintenance data for inclusion in Operating and Maintenance Manual. Include data for each type product, including all features and operating sequences, both automatic and manual. Provide the names, addresses, and telephone numbers of service organizations.
 8. Product certification signed by the manufacturer of the fire alarm system components certifying that their products comply with indicated requirements.
 9. Record of field tests of system.
- B. Submission to Authority Having Jurisdiction: In addition to routine submission of the above material, make an identical submission to the authority having jurisdiction. Include copies of shop drawings as required to depict component locations to facilitate review. Upon receipt of comments from the Authority, make resubmissions if required to make clarifications or revisions to obtain approval.

1.6 CLOSEOUT SUBMITTALS

- A. As-Built Project Records: Before acceptance of work and final inspection, the contractor shall provide project record "As-Built" drawings in AutoCAD, reflecting any and all changes and deviations made to the fire alarm system during construction. The drawings shall indicate the following:
1. As-built physical routing of wires to devices, including junction box locations.
 2. As-built riser diagram showing the zoning of initiating devices and notification appliances.
 3. As-built panel wiring diagrams of the fire alarm control panel(s).

4. Floor plan with final room number showing each alarm initiating device (1-10 for device 10 on IDnet 1 and 2-10 for device 10 on IDnet 2, etc.), and card number per notification appliance, TAC panel, and control point with their respective address identification number (i.e.) for addressable device number 5 on card 3, channel 1, branch 1 is 3-1-5. Device number 5 on card 3, channel 1 branch 2 cannot exist as it would have the same ID number as the device on branch 1. The devices on the branches must have higher numbers than the devices on the previous branches.
5. Submitting the original shop drawings back to the fire alarm vendor and specifying "no changes" shall not be acceptable. Submitted as-builts should be true as-builts and kept throughout the duration of construction.
6. The acceptance testing records.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. General: Furnish extra materials, packaged with protective covering for storage, and identified with labels clearly describing contents as follows:
 1. Break Rods for Manual Stations: Furnish quantity equal to 15 percent of the number of manual stations installed; minimum of 6 rods.
 2. Strobe Units: Furnish quantity equal to 10 percent of the number of units installed, but not less than one.
 3. Smoke Detectors or Sensors, Fire Detectors, and Flame Detectors: Furnish quantity equal to 10 percent of the number of units of each type installed but not less than one of each type.
 4. Detector or Sensor Bases: Furnish quantity equal to 2 percent of the number of units of each type installed but not less than one of each type.
 5. Printer Ribbons: Furnish 6 spare printer ribbons.

1.8. QUALITY ASSURANCE

- A. Installer Qualifications: The fire alarm technician for the project shall be State of California certified. The fire alarm technician shall be responsible for assisting the contractor in completing the installation and overall testing of the fire alarm system.
- B. Each and all items of the Fire Alarm System shall be listed as a product of a single fire alarm system manufacturer under the appropriate category by Underwriters Laboratories, Inc. (UL), and shall bear the "UL" label.

1.9. MAINTENANCE SERVICE

- A. Maintenance Service Contract: Provide maintenance of fire alarm systems and equipment for a period of 24 months, using factory-authorized service representatives.
- B. Basic Services: Systematic, routine maintenance visits on a quarterly basis at times scheduled with the Owner. In addition, respond to service calls within 24 hours of notification of system trouble. Adjust and replace defective parts and components

with original manufacturer's replacement parts, components, and supplies. Refer to paragraph 1.3.1 of this Section for maintenance service requirements of smoke detectors.

- C. Additional Services: Perform services within the above 12-month period not classified as routine maintenance or as warranty work when authorized in writing. Compensation for additional services must be agreed upon in writing prior to performing services.
- D. Renewal of Maintenance Service Contract: No later than 60 days prior to the expiration of the maintenance services contract, deliver to the Owner a proposal to provide contract maintenance and repair services for an additional one-year term. Owner will be under no obligation to accept maintenance service contract renewal proposal.

1.10 WARRANTY

- A. The Contractor shall provide a two-year written warranty against defects in material and workmanship (parts and labor) furnished under the project. The costs of such warranty shall be part of the project cost. The PI shall sign off on the system after passing a final acceptance test of the system (with the presence of an DISTRICT representative) and the electrical/fire alarm contractor shall provide written documentation of the final test. The District shall in addition (optional) perform its own complete test to determine the working order of the fire alarm system. The warranty period starts when the entire project is 100% completed (two years after acceptance, as defined by the fully signed NFPA 72 document). During the warranty period, the District shall monitor the site and request service as required through the appropriate installer. Prior to the expiration of the warranty period, the district may conduct a 100% test of the work performed. Any deficiencies found during that testing shall be corrected under the warranty agreement.
- B. The warranty shall include all necessary material, travel, labor and parts to replace defective components or materials at the job site. The Contractor shall commence repair of any "in warranty" defects within 24 hours of notification of such defects. Warranty service shall be supervised by a qualified factory-trained service representative.
- C. The Contractor shall make allowances in his warranty to cover diagnosis of system defects, which might ultimately be the responsibility of others to correct. When this occurs, the DISTRICT'S Representative and other affected trades shall be notified.
- D. The warranty shall include all necessary factory and field software required to perform the specified tasks.

PART 2 – PRODUCTS

2.1. ACCEPTABLE MANUFACTURER

- A. Manufacturers: The equipment and service described in this specification are those supplied and supported by Siemens per District Standards, no substitution shall be allowed.

2.2 FIRE ALARM CONTROL PANELS

- A. Fire alarm control panel is existing Siemens XLS.

- B. Furnish and install all associated Modules, addressable indicating and initiating devices with module for remote monitoring via internet.
- C. The following FACU hardware shall be provided:
1. Power Limited base panel with red cabinet and door, 120 VAC input power.
 2. 2,500 point capacity where (1) point equals (1) monitor (input) or (1) control (output).
 3. 2000 points of annunciation where one (1) point of annunciation equals:
 - a. 1 LED driver output on a graphic driver or 1 switch input on a graphic switch input module.
 - b. 1 LED on panel or 1 switch on panel.
 4. From all battery charging circuits in the system provide battery voltage and ammeter readouts on the FACU LCD Display.
 5. One Auxiliary electronically resettable fused 2A @24VDC Output, with programmable disconnect operation for 4-wire detector reset.
 6. One Auxiliary Relay, SPDT 2A @32VDC, programmable as a trouble relay, either as normally energized or de-energized, or as an auxiliary control.
 7. Three (3) Class B Addressable Notification Appliance Signaling Line Circuits (SLCs).
 - a. Each Addressable Notification Appliance SLC shall be rated at 3A and capable of supporting up to 63 Notification Appliances per channel.
 - b. Wiring shall be 18 AWG to 12 AWG unshielded twisted pair wire. Systems that require shielded wire for Notification Appliances shall not be accepted.
 - c. A constant voltage under both primary and secondary power conditions shall be maintained at the notification appliance field wiring terminal connections in the FACU to ensure the voltage drop on the circuit is consistent under both primary and secondary power conditions.
 - d. For systems that do not provide a constant voltage source at the FACU notification appliance field wiring terminal connections, the fire alarm contractor shall:
 - 1). Provide separate point-to-point voltage drop calculations for all notification appliances under worst case secondary power specifications, and
 - 2). Perform a complete functional test of all notification appliances under worst case secondary power conditions.
 - f. Where required provide Intelligent Remote Battery Charger for charging up to 110Ah batteries.

- g. Power Supplies with three (3) Class B integral Intelligent Addressable Notification Appliance Signaling Line Circuits (SLCs) for system expansion.
 - h. The FACU shall support up to (5) RS-232-C ports and one service port. All (5) RS-232 Ports shall be capable of two-way communications.
 - i. Remote Unit Interface: supervised serial communication channel for control and monitoring of remotely located annunciators and I/O panels.
 - j. Fire Panel Internet Interface to provide supplemental notification and remote user access to the FACU using Ethernet and TCP/IP communications protocol compatible with IEEE Standard 802.3.]
 - k. Modular Network Communications Card.
8. Cabinet: Lockable steel enclosure. Arrange unit so all operations required for testing or for normal care and maintenance of the system are performed from the front of the enclosure. If more than a single unit is required to form a complete control unit, provide exactly matching modular unit enclosures.
9. Alphanumeric Display and System Controls: Panel shall include an 80 character LCD display to indicate alarm, supervisory, and component status messages and shall include a keypad for use in entering and executing control commands.
- a. The system shall [have the capability] [include the necessary hardware] to provide expanded content, multi-line, operator interface displays as indicated on the drawings and specifications. The expanded content multi-line displays shall be Quarter-VGA (QVGA) or larger and be capable of supporting a minimum of 854 standard ASCII characters to minimize or eliminate the levels of navigation required for access to information when responding to critical emergencies and abnormal system conditions. The QVGA operator interface shall provide operator prompts and six context sensitive soft-keys for intuitive operation.
10. Distributed Module Operation: FACU shall be capable of allowing remote location of the following modules; interface of such modules shall be through a Style 4 (Class B) supervised serial communications channel (SLC):
- a. Addressable Signaling Line Circuits
 - b. Initiating Device Circuits
 - c. Notification Appliance Circuits
 - d. Auxiliary Control Circuits
 - e. Graphic Annunciator LED/Switch Control Modules.
 - f. Amplifiers, voice and telephone control circuits
11. Voice Alarm: Provide an emergency communication system, integral with the FACU, including voice alarm system components, microphones, amplifiers, and tone generators. Features include:

- a. Amplifiers comply with UL 1711, "Amplifiers for Fire Protective Signaling Systems." Amplifiers shall provide an onboard local mode temporal coded horn tone as a default backup tone. Test switches on the amplifier shall be provided to test and observe amplifier backup switchover. Each amplifier shall communicate to the host panel amplifier and NAC circuit voltage and current levels for display on the user interface. Each amplifier shall be capable of performing constant supervision for non-alarm audio functions such as background music and general paging.
- b. Dual alarm channels permit simultaneous transmission of different announcements to different zones or floors automatically or by use of the central control microphone. All announcements are made over dedicated, supervised communication lines. All risers shall support Class A or Class B wiring for each audio channel.
- c. Eight channel digitally multiplexed audio for systems that require more than two channels of simultaneous audio. Up to 8 channels of audio shall be multiplexed on either a style 4 or style 7 twisted pair.
- d. Emergency voice communication audio controller module shall provide up to 32 minutes of message memory for digitally stored messages. Provide supervised connections for master microphone and up to 5 remote microphones.
- e. Status annunciator indicating the status of the various voice alarm speaker zones and the status of fire fighter telephone two-way communication zones.
- f. When required, Redundant Voice Command Centers shall be capable of generating voice paging from more than one node in a network audio system.

2.3 FIRE ALARM SYSTEM POWER SUPPLIES

A. System primary power:

1. Primary power for the FACP and the secondary power battery chargers shall each be obtained from the power panel board. Circuit breakers shall be fitted with a suitable guard, requiring removal of a screw to open, and used only for fire alarm.
2. The power supply and battery charging shall be provided by the power supply interface board and power supply module.
3. A fusible double throw AC power disconnect switch, lockable in the open and closed positions shall be provided adjacent to the Fire Alarm Control Panel.

B. Secondary power supply:

1. Provide sealed gelled electrolyte batteries as the secondary power supply for the fire alarm control panel and each system circuit interface panel. The battery supply shall be calculated to operate its load in a supervisory mode for 24 hours with no primary power applied and, after that time, operate its alarm mode for five minutes.
2. Provide battery charging circuitry for each standby battery bank in the system low voltage power supply or as a separate circuit. The charger shall be

automatic in design, adjusting the charge rate to the condition of the batteries. Battery charge rate and terminal voltage shall be read using the fire alarm control panel LCD display in the service mode, indicating directly in volts and amps.

2.4 SAFELINC INTERNET MODULE

- A. Furnish as a part of the installed system, a 4100-6060 SAFELINC INTERNET MODULE. Furnish and install (2) CAT5 cables from main FACP to designated MDF/IDF location as depicted on drawings.

2.5 AREA AND SPOT DETECTION

- A. Furnish and install Simplex, Photoelectric True Alarm Smoke Sensors, with Simplex True Alarm Detector Bases.
- B. General:
 - 1. Common base for detachable, low profile, photoelectric type smoke, and heat detector heads.
 - 2. Monitoring: FACU shall individually monitor sensors for calibration, sensitivity, and alarm condition, and shall individually adjust for sensitivity. The control unit shall determine the condition of each sensor by comparing the sensor value to the stored values.
 - 3. Each sensor base shall contain an LED that will flash each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the sensor base LED shall be on steady.
 - 4. Each sensor base shall contain a magnetically actuated test switch to provide for easy alarm testing at the sensor location.
 - 5. Each sensor shall be scanned by the Control Unit for its type identification to prevent inadvertent substitution of another sensor type. Upon detection of a "wrong device", the control unit shall operate with the installed device at the default alarm settings for that sensor; 2.5% obscuration for photoelectric sensor, 135-deg F and 15-deg F rate-of-rise for the heat sensor, but shall indicate a "Wrong Device" trouble condition.
 - 6. Environmental Compensation: The FACU shall maintain a moving average of the sensor's smoke chamber value to automatically compensate for dust, dirt, and other conditions that could affect detection operations.
 - 7. Programmable Sensitivity: Photoelectric Smoke Sensors shall have 7 selectable sensitivity levels ranging from 0.2% to 3.7%, programmed and monitored from the FACU.
 - 8. Sensitivity Testing Reports: The FACU shall provide sensor reports that meet NFPA 72 calibrated test method requirements.
 - a. Reports shall be capable of being printed for annual recording and logging of the calibration maintenance schedule.
 - b. Where required, reports shall be accessible remotely through:
 - 1) A Fire Panel Internet Interface using Ethernet and TCP/IP communications protocol compatible with IEEE Standard

802.3. The Fire Panel Internet Interface shall be capable of automatically scheduling email reports to individual user accounts on a weekly, bi-weekly, or monthly schedule

- 2) A PC Annunciator using an RS232-C connection to the FACU or a PC Annunciator Client using a TCP/IP communications protocol connection to the PC Annunciator server compatible with IEEE Standard 802.3.

9. The FACU shall automatically indicate when an individual sensor needs cleaning. The system shall provide a means to automatically indicate when a sensor requires cleaning. When a sensor's average value reaches a predetermined value, (3) progressive levels of reporting are provided. The first level shall indicate if a sensor is close to a trouble reporting condition and will be indicated on the FACU as "ALMOST DIRTY." This condition provides a means to alert maintenance staff of a sensor approaching dirty without creating a trouble in the system. If this indicator is ignored and the second level is reached, a "DIRTY SENSOR" condition shall be indicated at the FACU and subsequently a system trouble is reported to the Supervising Station. The sensor base LED shall glow steady giving a visible indication at the sensor location. The "DIRTY SENSOR" condition shall not affect the sensitivity level required to alarm the sensor. If a "DIRTY SENSOR" is left unattended, and its average value increases to a third predetermined value, an "EXCESSIVELY DIRTY SENSOR" trouble condition shall be indicated at the control unit.
10. The FACU shall continuously perform an automatic self-test on each sensor that will check sensor electronics and ensure the accuracy of the values being transmitted. Any sensor that fails this test shall indicate a "SELF TEST ABNORMAL" trouble condition.
11. Multi-Sensors shall combine photoelectric smoke sensing and heat sensing technologies. An alarm shall be determined by either smoke detection, with selectable sensitivity from 0.2 to 3.7 %/ft obscuration; or heat detection, selectable as fixed temperature or fixed with selectable rate-of-rise; or based on an analysis of the combination of smoke and heat activity.
12. Programmable bases. It shall be possible to program relay and sounder bases to operate independently of their associated sensor.
13. Magnet test activation of smoke sensors shall be distinguished by its label and history log entry as being activated by a magnet.

C. Photoelectric type area smoke detector:

1. LED light source, silicon photodiode receiving element. Line filter and time delay circuitry to prevent transient false alarms.
2. 360-degrees smoke entry, locking tamper screw, pulsating on power LED indicator, UL 268.

D. Area heat detector:

1. 135-degrees fixed temperature self restoring type.
2. Locking tamper screw, UL 521.
3. Thermal sensor shall be of the epoxy encapsulated electronic design. It shall be thermostat-based, rate-compensated, self-restoring and shall not be affected by thermal lag.

4. Sensor fixed temperature sensing shall be independent of rate-of-rise sensing and programmable to operate at 135-deg F or 155-deg F. Sensor rate-of-rise temperature detection shall be selectable at the FACU for either 15-deg F or 20-deg F per minute.
5. Sensor shall have the capability to be programmed as a utility monitoring device to monitor for temperature extremes in the range from 32-deg F to 155-deg F.

2.6 ADDRESSABLE MODULE

- A. Furnish and install Simplex Individual Addressable Module(s)

2.7 MANUAL STATIONS

- A. Provide and install Simplex Addressable Manual Pull Stations Single Action, with Individual Addressable Modules and Back Box for Pull Stations. All except the Master pull stations shall be provided with an additional cover box. Manufactured by Signal Communications, Corp. Front Cover Model NO.ST-FRCO1, Extender Model NO. ST KTRO1 or approved equal.

2.8 BEAM DETECTORS

- A. Separate transmitter and receiver units, UL 268.
- B. Microprocessor based, temperature compensated, automatic gain control, field-adjustable beam obscuration sensitivity, adjustable optics, auxiliary contacts, tamper switch, red LED alarm indicator, and yellow LED trouble indicator.
- C. Provide a remote indicator/test unit.

2.9 DUCT TYPE SMOKE DETECTION

- A. General:
 1. Common base for detachable ionization or photoelectric type smoke detector head.
 2. Duct housing with hinged door and full length sampling tube. Visible alarm LED, remote LED output, UL 268A.
 3. Provide auxiliary contacts.
 4. The Duct Housing shall provide a supervised relay driver circuit for driving up to 15 relays with a single "Form C" contact rated at 7A@ 28VDC or 10A@ 120VAC. This auxiliary relay output shall be fully programmable. Relay shall be mounted within 3 feet of HVAC control circuit.
 5. Duct Housing shall provide a relay control trouble indicator Yellow LED.
 6. Duct Housing shall have a transparent cover to monitor for the presence of smoke. Cover shall secure to housing by means of four (4) captive fastening screws.
 7. Duct Housing shall provide two (2) Test Ports for measuring airflow and for testing. These ports will allow aerosol injection in order to test the activation of the duct smoke sensor.
 8. Duct Housing shall provide a magnetic test area and Red sensor status LED.
 9. For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housing front cover

- B. Photoelectric type area smoke detector:
 - 1. LED light source, silicon photodiode receiving element. Line filter and time delay circuitry to prevent transient false alarms.
 - C. Remote alarm indicator:
 - 1. Ceiling mounted, red LED, stainless steel faceplate engraved ALARM. Provide where duct type smoke detectors are installed above a ceiling.
- 2.10 ADDRESSABLE TRANSMITTERS/MONITOR MODULES
- A. Addressable transmitters/monitor modules shall be provided where required to interface with contact alarm devices.
- 2.11 ADDRESSABLE RELAY MODULES
- A. Addressable relay modules shall be provided where required to provide audible alarm interface and/or relay control interface.
- 2.12 ADDRESSABLE TRANSMITTERS/MONITOR/CONTROL MODULES
- A. Addressable Dual point Multi-state input and relay output modules shall be provided where required to interface with tri-state alarm devices.
- 2.13 DOOR HOLDERS
- A. Door Holders shall be Edwards Signaling type and shall be 24VDC with operating power provided by the FACP.
 - B. Description: Units shall be listed to UL 228. Units are equipped for wall or floor mounting as indicated and are complete with matching door plate. Unit shall operate from a 120VAC, a 24VAC or a 24VDC source, and develop a minimum of 25 lbs. holding force.
 - C. Material and Finish: Match door hardware.
- 2.14 TAMPER SWITCH
- A. Tamper switch with Individual Addressable Module.
- 2.15 FLOW SWITCH
- A. Flow switch with Individual Addressable Module.
 - B. System software programming shall be performed by Simplex/Grinnell. Other vendor programming of system software is not permitted.
 - C. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor, subject to the approval of the District's Electrical Engineer.

2.16 EVACUATION SIGNAL

- A. Furnish and install where show on the drawings, audible and /or visual signals, Simplex type audio visual devices with the following characteristic and capacities:
 - 1. Electronic horn model series with a sound rating of 90 dba and temporal pattern per code and speaker per code, and a strobe light with an intensity of 15, 75, and 110 candela (where required) Provide and install factory-manufactured red-painted steel wireguard to protect unit(s) in boys and girls bathrooms areas subject to vandalism, mount exterior horns in weather proof enclosures.
 - 2. Visual alarm signals model 15, 75 and 110 series shall be furnished with minimum light intensity of 15, 75, and 110 candela complying with the ADA act and the following requirements:
 - a. Xenon strobe with a minimum repetition rate of 1HZ, not exceeding 2 HZ and maximum duty cycle of 40% with pulse duration of .2 seconds.
 - b. Provide factory-made re-painted steel wire-guard to protect strobe.
 - 3. If more than one strobe in one room or area, all strobes shall be synchronized.

PART 3 – EXECUTION

3.1. INSTALLATION, GENERAL

- A. Install system components and all associated devices in accordance with applicable NFPA Standards and manufacturer's recommendations.
- B. Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of fire alarm systems. Examples of qualified personnel shall include, but not be limited to, the following:
 - 1. Factory trained and certified personnel.
 - 2. National Institute of Certification in Engineering Technologies (NICET) fire alarm level III certified personnel.
 - 3. Personnel licensed or certified by state or local authority.

3.2. EQUIPMENT INSTALLATION

- A. Furnish and install a complete Fire Alarm System as described herein and as shown on the plans. Include sufficient control unit(s), annunciator(s), manual stations, automatic fire detectors, smoke detectors, audible and visible notification appliances, wiring, terminations, electrical boxes, and all other necessary material for a complete operating system.
- B. Existing Fire Alarm Equipment shall be maintained fully operational until the new equipment has been tested and accepted.

- C. Equipment Removal: After acceptance of the new fire alarm system, disconnect and remove the existing fire alarm equipment and restore damaged surfaces. Package operational fire alarm and detection equipment that has been removed and deliver to the Owner. Remove from the site and legally dispose of the remainder of the existing material.
- D. Water-Flow and Valve Supervisory Switches: Connect for each sprinkler valve required to be supervised.
- E. Device Location-Indicating Lights: Locate in the public space immediately adjacent to the device they monitor.

3.3. WIRING INSTALLATION

- A. System Wiring: Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the Authority Having Jurisdiction (AHJ) and shall be installed in accordance with the appropriate articles from the current approved edition of NFPA 70: National Electrical Code (NEC).
- B. Contractor shall obtain from the Fire Alarm System Manufacturer written instruction regarding the appropriate wire/cable to be used for this installation. No deviation from the written instruction shall be made by the Contractor without the prior written approval of the Fire Alarm System Manufacturer.
- C. Color Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color code for alarm initiating device circuits wiring and a different color code for supervisory circuits. Color-code notification appliance circuits differently from alarm-initiating circuits. Paint fire alarm system junction boxes and covers red.

3.4. TEST/FIELD QUALITY CONTROL

- A. The DISTRICT team shall be notified 72 hours prior to any and all acceptance testing of alarm systems, so monitoring of the fire alarm system can be initiated, and DISTRICT team shall be scheduled to attend the testing. The contractor will pay for expenses at \$100/hour/person attending a final test should more than three devices fail.
- B. Prior to the final acceptance test, the Contractor shall perform a complete pre-test with the fire alarm vendor, the District's fire alarm technicians and their fire alarm consultant. The pre-test shall be for all fire alarm equipment and testing records of the pre-test shall be provided to ensure a successful final acceptance test. As part of the completion of work on the fire alarm systems, a full documented test of all the components of the fire alarm system shall be performed. A representative from the DISTRICT team shall be present for the test. Any deficiencies reported by the district representatives and/or district consultant shall be corrected and re-tested prior to calling for the final inspection.
- C. A report certifying that the installation is complete, pre-tested, and fully operational shall be developed and forwarded by the fire alarm technician to the DISTRICT Project Manager. The final acceptance test will not be scheduled until the pre-test documentation and NFPA 72, Record of Completion have been submitted to the DISTRICT project Manager.
- D. The Contractor, DISTRICT team, the PI and an authorized representative from each supplier of equipment shall be in attendance at the final acceptance test to make necessary adjustments. The final test shall include, but not be limited to:

1. Activation of all initiating devices.
 2. Activation of every sprinkler control and monitoring device, with a test of the time of activation.
 3. Activation and visual check of every notification appliance device.
 4. Activation of all fire alarm controlled components. These shall include, but not be limited to, magnetic door holders, fan shutdowns, elevator recall, etc.
 5. A test of the system for electrical supervision, including detection of ground faults of the 24 VDC system(s).
 6. The system(s) shall be placed on battery power for 24 hours before the scheduled acceptance test, so that the system can be verified for 24 hours of standby power and 15 minutes of notification signal operated on battery power.
 7. Confirmation that the dialer is receiving all required signals and that all points are reporting off-site in the correct manner.
- E. The Contractor shall pay all overtime fees required by the PI and DISTRICT personnel for witnessing the acceptance test.
- F. After the final acceptance, the NFPA 72, Record of Completion shall be signed by the PI, installing contractor and a factory certified technician, certifying that the fire alarm system has been installed, tested and will function in accordance with the manufacturer's specifications and the DISTRICT'S requirements.
- G. Although acceptance testing is only for the portion of the school fire alarm system associated with the project, if any existing fire alarm signaling, notification or control circuit has been disrupted, then the contractor shall be responsible for testing 10 percent of the existing field devices to assure the PI and the DISTRICT team that the existing devices are functional. The 10% test should include 10% of the existing initiating devices and 10% of the existing notification devices. If any of the ten percent devices fail, only the repaired devices need to be re-tested after they are repaired or replaced.
- H. If the fire alarm installation or modification is in "phased" stages or if there are substantial corrections and additions to the scope of the project, then the contractor shall assume responsibility for subsequent testing and retesting of the fire alarm system installation. After the last phase of the fire alarm system has been completed and tested totally, ten percent of the previously completed phases are to be tested with the final tested phase.
- I. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.
- J. Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of fire alarm systems. Examples of qualified personnel shall be permitted to include, but shall not be limited to, individuals with the following qualifications:
1. Factory trained and certified.
 2. National Institute for Certification in Engineering Technologies (NICET) fire alarm certified.

3. International Municipal Signal Association (IMSA) fire alarm certified.
 4. Certified by a state or local authority.
 5. Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems.
- K. Pretesting: Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.
 - L. Final Test Notice: Provide a 10-day minimum notice in writing when the system is ready for final acceptance testing.
 - M. Minimum System Tests: Test the system according to the procedures outlined in NFPA 72.
 - N. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.
 - O. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log.
 - P. Final Test, Certificate of Completion, and Certificate of Occupancy:
 1. Test the system as required by the Authority Having Jurisdiction in order to obtain a certificate of occupancy.

3.5. CLEANING AND ADJUSTING

- A. Cleaning: Remove paint splatters and other spots, dirt, and debris. Clean unit internally using methods and materials recommended by manufacturer.
- B. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound levels and adjusting controls and sensitivities to suit actual occupied conditions. Provide up to three visits to the site for this purpose.

3.6. TRAINING

- A. Provide the services of a factory-authorized service representative to demonstrate the system and train Owner's maintenance personnel as specified below.
 1. Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintaining of the system. Provide a minimum of 8 hours' training.
 2. Schedule training with the Owner at least seven days in advance.

END OF SECTION

06/08/18

SECTION 31 10 00

SITE PREPARATION & PLANT PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Protecting improvements and vegetation to remain.
- B. Clearing and grubbing.
- C. Removal of existing site improvements including but not limited to concrete, utilities, curbs, fencing, and irrigation system.
- D. Preserve and protect adjoining properties during removal work, site preparation work and construction.
- E. Generally, this project includes construction of new building and associated improvements including but not limited to: Protection of existing improvements, demolition, staking, site preparation, storm drainage, earthwork, concrete work, asphalt work, site furnishings, irrigation, and all reasonably incidental and related work as shown on plans and as specified.

1.2 QUALITY ASSURANCE

- A. Stipulations – Site Preparation and Demolition:
 - 1. Work is in accordance with the Drawings and specifications and includes but is not necessarily limited to the following:
 - a. Clearing and grubbing.
 - b. Identification and protection of vegetation indicated to remain.
 - c. Removal of existing site improvements, such as, paving and bases, concrete curbs, fences, footings, foundations, irrigation system, underground pipes and utilities and structures.
 - 2. Locate and identify existing utility services and protect or disconnect, remove and cap as required for new work.
 - 3. Remove, clean, store and protect all items designated and directed to be salvaged to Owner.
 - 4. Remove, store and protect all items designated and directed to be reinstalled.
 - 5. Obtain and pay for permits required for execution of this work.

1.3 SUBMITTALS

- A. Photographs or videotape, sufficiently detailed, of existing conditions of adjacent streets, adjacent parking areas, trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site demolition.

- B. The Contractor is to submit a letter with the relevant material submittals certifying that the products used by the Contractor are consistent with the Environmental Safety Policy of the School District.

1.4 PROJECT CONDITIONS

- A. Coordination: Coordinate this work with the work of other Sections to avoid delay and interference with other work. Refer to the Demolition Plan for site work requirements.
- B. Nuisances: Keep dirt, dust, noise and other objectionable nuisance to a minimum. Use temporary enclosures, coverings and sprinkling, and combinations thereof, as necessary to limit dust to lowest practicable level, except do not use water to the extent that it causes or contaminated run-off.
- C. Traffic: Conduct work to ensure minimum interference with vehicular and pedestrian traffic, and to permit unencumbered access to the school property located outside of the project areas including the track and field.
 - 1 Do not close or obstruct streets, sidewalks, or other public passageway without permission from authorities having jurisdiction.
 - 2 If required, by governing authorities, provide alternate routes around closed and obstructed traffic ways.
 - 3 Do not drive any type of vehicle or store products on asphalt that is curing unless the area has been protected. Vehicles and storage areas are limited to the areas of thickened asphalt pavement section as shown on the drawings or as designated by the District Representative. Submit a protection plan to the District for approval prior to start of demolition work.
- D. Dispose of cleared, grubbed, and removed material that will not be salvaged or recycled on Site.
- E. Salvable Improvements: Carefully remove items indicated to be salvaged and store where designed by the District Representative. Avoid damaging salvage material.
- F. Protections:
 - 1. Prevent movement and settlement or adjacent structures. Install temporary barriers, fences, guard rails, enclosures, shoring, bracing, planking, warning signs and other protections required to protect structures, utilities, landscaping and other items that are to remain in place.
 - 2. Protect benchmarks, monuments and reference points from displacement and damage; and if displaced or damaged, replace at no cost to the Owner.
 - 3. Install and maintain required bracing, shoring and supports when removing structural elements and be responsible for safety and support of structure. If safety of structure appears to be endangered, cease operations and immediately notify the District Representative. Do not resume operations until safety is restored.

PART 2 – PRODUCTS

2.1 SOILS MATERIALS

- A. Satisfactory Soil Materials. See Section 31 20 00, Earthwork for satisfactory soil material for backfilling excavations and depressions resulting from site clearing.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine areas in which work is to be performed. Report in writing to the District's Representative all prevailing conditions that will adversely affect satisfactory execution of work. Do not proceed with work until unsatisfactory conditions have been corrected.
- B. Starting work constitutes acceptance of the existing conditions and the Contractor shall then, at his expense, be responsible for correcting unsatisfactory and defective work encountered.
- C. For the duration the project, provide a construction fence at the perimeter of project(s) as required to secure the project from trespass and provide a safe construction site. Field verify the perimeter and gate locations with the Construction Manager. The fence location may be adjusted as the project progresses based on the approval of the District's Representative.

3.2 CLEARING

- A. Remove designated trees, stumps, rubbish, undergrowth and deadwood as well as fences and incidental structures that interfere with the construction as shown on the Drawings and as specified. Obtain verification from project inspector prior to removal.

3.3 GRUBBING

- A. Remove all stumps and roots in their entirety, brush, organic materials and debris. When indicated, such materials as topsoil and leaf mold, or other organic materials above the ground surface suitable for use as mulch or topsoil, shall be salvaged and stockpiled.
- B. Remove grasses and weeds. Apply systemic weed killer and confirm weed kill prior to removal.

3.4 TOPSOIL STRIPPING – As required

- A. Coordinate with Section 31 20 00, Earthwork, and Drawings. Strip topsoil to required depths in a manner to prevent intermingling with underlying subsoil or other waste materials.

3.5 UTILITIES

- A. Contract local utility companies 48 hours minimum prior to start of demolition work. Confirm verbal notices and written notices. Verify locations of all utilities entering site and their locations on site.
- B. Cooperate with the District's Representative, utility companies, adjacent property owners, and other building trades in maintaining, protecting, re-routing or extending utilities passing

though work areas which serve structures located on project site and on adjacent properties.

- C. Verify that utilities that are to be removed, capped or abandoned are turned off, or are disconnected, or are re-routed to new locations before starting demolition.

3.6 REMOVAL

A. General:

1. Remove materials in an orderly and careful manner.
2. Repair or replace all removal work performed in excess to that required at no cost to the District. Repair or replacement shall match and equal construction, condition and finish existing at time of award of Contract.

B. Remove the following from locations to the extent required or directed for new construction.

1. Fencing, including posts, fabric and footings. Backfill voids if required from removed footings with clean fill as defined in Section 31 20 00, Earthwork. Be careful of soil caving due to presence of groundwater intrusion.
2. Electric underground wires and conduits occurring within removal areas except those shown as reused on Electrical Drawings. Refer to Utility Drawings and Specifications.
3. Miscellaneous structural elements that interfere with the new construction as directed.
4. Paving: remove asphalt and concrete paving including aggregate base rock completely to the minimum depth required for subgrade of new improvements. Dispose of demolished concrete, asphalt and base rock at a material recycling facility. Existing aggregate base may be reused on site if it meets requirements of 31 20 00 fill and the approval of the Geotechnical Engineer.
5. Underground pipes and utilities.
6. Other items noted on the drawings and required to be removed to install the new improvements.

C. Cutting asphalt, concrete curbs and concrete pavement:

1. All lines shall be marked and accepted by District's Representative before the cutting operation.
2. Cut edges of pavement at 90-degree angle to the surface in a true and straight line in accordance with dimensions shown on the Drawings. Make cuts with a concrete saw, to a 1-1/2" minimum depth.

D. Backfill and compact areas excavated and open pits and holes resulting from removal operations. Comply with requirements specified for backfill materials, compaction and installation methods.

E. Rough grade site within removal areas to meet adjacent contours and to provide positive drainage. Leave site in clean condition acceptable for performance of subsequent construction operations.

3.7 CLEANUP AND DISPOSAL, per Section 01 70 00:

- A. Transport trash, rubbish and debris daily from site and legally dispose of:
 - 1. Demolish and waste materials encountered.
 - 2. Remove and promptly dispose of contaminated, vermin-infested and dangerous materials encountered.
 - 3. Do not burn or bury materials on site.
- B. Clean excess soil may be distributed on site as accepted by the Project Inspector, if it does not adversely affect specified finish grades. Coordinate with Section 31 20 00 Earthwork, Drawings and, Subgrade Preparation & Base Material.
- C. Excess soil may need to be legally disposed of off site. Refer Existing Conditions. Coordinate with Section 31 20 00, Earthwork, Drawings.
- D. Upon completion of work under this Section, remove all tools, equipment and temporary enclosures and structures.

END OF SECTION

06/08/18

SECTION 31 20 00

EARTHWORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide earthwork complete, including removal work and clearing, grading, excavating and fill, and dewatering.

1.2 QUALITY ASSURANCE

A. Reference Standards:

1. Perform work in compliance with the rules and regulations of the Division of Industrial Safety and other local State agencies having jurisdiction. Nothing contained herein shall be construed as permitting work that is contrary to such rules, regulations, and codes.
2. Perform all work in accordance with all applicable laws, codes and regulation required by the State of California,
3. Comply with the State Water Resources Control Board.
4. Work shall conform to local codes and regulations.
5. References to "Standard Specifications" shall mean the Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation, Cal Trans.
6. ASTM Standards.
7. Relative compaction refers to the in-place dry density of the same soil expressed as a percentage of the maximum dry density of the same soil determined by ASTM D1557 laboratory test procedure. Optimum Moisture Content is the water content that corresponds to the maximum dry density as determined by the same procedure.

1.3 SUBMITTALS, per Section 01 33 00.

- A. Submit a list of grading equipment to be used.
- B. Submit an analysis of physical and chemical properties and certificate of compliance of environmental clearance for import soil.
- C. Before the grading operation is underway, submit a letter identifying the approximate quantities and type of soil required to be imported and exported in order to accomplish a balance of the earthwork materials without additional compensation.
- D. The Contractor is to submit a letter with the relevant material submittals certifying that the products used by the Contractor are consistent with the Environmental Safety Policy of the School District.

1.4 SOILS REPORT

- A. A soil investigation report has been prepared for the project by the soils engineer. Refer to Document 00 31 32 – Geotechnical Data.
- B. This report is available in the office of the Owner's Representative for inspection by the Contractor. Unless otherwise specified, it is intended that all earthwork be performed in accordance with the provisions of this report.

1.5 SOILS BORINGS

- A. Subsurface soils investigations have been made at the site and logs of the test holes are available in the Soils Report. Such investigations have been made for the purposes of design only, and neither the Architect, the Owner, nor the Soils Engineers guarantee adequacy or accuracy of the data, or that data are representative of all conditions to be encountered. Such information is made available for general information only and shall not relieve the Contractor of the responsibility for making his own investigations.

1.6 PROJECT CONDITIONS

- A. Coordination: Coordinate this work with the work of other Sections to avoid delay and interference with other work. Refer to Section 01 11 00 for site work sequencing requirements.
- B. Protect excavations by shoring, bracing, sheeting, underpinning, or other methods as required to prevent cave-ins or loose dirt from entering excavations. Barricade open excavations and post warning lights at work adjacent to public streets and walks.
- C. Underpin adjacent structure(s), including utility service lines, which may be damaged by excavation operations.
- D. Promptly repair damage to adjacent facilities caused by earthwork operations. Cost of repair at Contractor's expense.
- E. Promptly notify the Inspector of unexpected subsurface conditions.
- F. If during the course of the earthwork operations, an area of pumping or otherwise unstable soil is encountered, the contractor shall immediately modify his operations in such a way as to limit the frequency and weight of vehicles traveling over the area and promptly notify the Inspector who will contact the Geotechnical Engineer for an evaluation.

1.7 EXISTING CONDITIONS

- A. A topographic survey of the property has been included in the drawings for reference only. Upon the beginning of the earthwork, Contractor represents that he has inspected the site and satisfied himself as to actual grades and levels and the true conditions under which the work is to be performed.

1.8 PROTECTION

- A. Furnish, place and maintain all supports, shoring and sheet piling which may be required for the earthwork operations.
- B. Maintain all benchmarks, monuments, and other reference points. If disturbed or destroyed, replace as directed.

- C. Adequate protection measures shall be provided to protect workmen, passers-by, and the site. Streets and adjacent property shall be fully protected throughout the operations.
- D. In accordance with generally practiced construction practices, the Contractor shall be solely and completely responsible for working conditions on the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours.
- E. Any construction review of the Contractor's performance conducted by the Inspector is not intended to review the adequacy of the Contractor's safety measures in, on, or near the construction site.
- F. Adjacent streets, sidewalks, and property shall be kept free of mud, dirt, or similar nuisances resulting from earthwork operations.
- G. Provide for surface drainage during the period of construction in a manner to avoid creating a nuisance to adjacent areas.
- H. Water as required to suppress dust nuisance.
- I. Protection of Existing Improvements:
 - 1. Provide barricades, covering, or other types of protection necessary to prevent damage to existing improvements indicated to remain in place. Protect improvements on adjoining properties. Repair damaged existing improvements to original condition as approved by authority having jurisdiction.
- J. Provide erosion control measures as required.
- K. Protection of Other Property: Excavation and other work over, under and adjacent to existing pipelines, cables, conduit ruins or structures of any kind shall be procured in such a manner as not to interfere with the safe operation and use of such installations. Should any damage be incurred to existing facilities during the Contractor's operations, the Contractor shall immediately notify the Owner's Representative and authorities, and shall arrange for the immediate repair of same at his expense.
- L. Underground Obstruction: The locations of existing underground utilities and structures, insofar as that are known from information furnished by the respective utility companies and agencies, have been shown on the drawings. The Owner assumes no responsibility for the accuracy or completeness of the said data, which is offered solely for the convenience of the Contractor.
- M. Control of Water: Take measures as may be required and furnish, install and operate such pumps or other devices as may be necessary to remove any seepage, storm water, or sewage that may be found or may accumulate in the excavations during the progress of the work. Keep excavations entirely free from water at all times during the progress of the work, and until the Geotechnical Engineer gives permission to cease pumping.
- N. Pavement Restoration: Pavement, bases and compacted subgrade disturbed by the trenching operations shall be replaced in an acceptable manner with materials equal to the adjacent compacted subgrade, bases and pavement for a minimum of 12" on each side of the trench, and shall conform to the requirements of these Specifications or to local ordinances governing such replacement.

1.9 FIELD QUALITY CONTROL

- A. Contractor shall provide adequate notice, cooperate with, provide access to the work, and assist testing agency and their representative in the execution of their function.

- B. When, during the progress of work, field tests indicate that installed compacted materials do not meet specified requirements, provide additional compaction until specified density is achieved, or remove and replace defective materials with new materials as directed by the Inspector. Costs of additional labor, materials, and testing to attain specified density at Contractor's expense.
- C. The Contractor shall engage a California Registered Civil Engineer or licensed Land Surveyor to perform field engineering.
- D. The Contractor shall engage a California Registered Civil Engineer or licensed Land Surveyor to perform a conformance survey at completion of the project and provide a hard copy of the survey at completion of the project and an AutoCAD copy of the survey as part of the closeout documents.
- E. Perform all grading with hydraulically laser controlled grading machinery.

1.10 TESTING

- A. Testing and Inspection: Testing shall be performed by a qualified independent testing laboratory under the supervision of a registered professional engineer, specializing in soils engineering.
- B. The Owner will direct, provide, and pay for initial testing and inspection during earthwork operations.
- C. Provide and pay for re-testing and inspection during earthwork operations. Laboratory and inspection service shall be acceptable to the Owner.
- D. Where reference is made to relative compaction, it shall be the in-place dry density of soil expressed as a percentage of the maximum dry density of the same material, determined by the ASTM D1557 laboratory test procedure. Optimum moisture is the water content that corresponds to the maximum dry density.
- E. For structural fills under footings, slabs or pavements. determine moisture density relationships in accordance with ASTM D1557.

PART 2 - PRODUCTS

2.1 FILL

- A. Structural Fill Materials: Inert subsoil material free of organic matter, rubbish, debris, and rocks greater than 3" diameter, and meeting the following requirements:
 - 1. Liquid limit of less than 40.
 - 2. Plastic index of less than 15, per ASTM D4318.
 - 3. Minimum laboratory dry weight at optimum moisture content of 110 pounds per cubic foot.
 - 4. Provide imported fill material as required to complete the work. Obtain rights and pay all cost for imported materials.
 - 5. Proposed fill material shall be inspected, tested, and laboratory report issued prior to use in the work.

6. Suitable excavated material removed to accommodate new construction may be used as fill material subject to inspection and approval.
7. All fill material is subject to testing and inspection by the Geotechnical Engineer.

B. Filter Materials:

1. Drain Rock: Per Section 32 13 13.
2. Angular Washed Sand: Per Section 32 13 13.

2.2 TOPSOIL

- A. Topsoil is defined as on-site surface soil. Satisfactory topsoil shall be free of subsoil, clay, lumps, stones, and other objects over 1/2" in diameter, without any weeds, roots and other objectionable material.
- B. If herbicide contamination is suspected, then a radish/ryegrass growth trial must be performed. Consult with Inspector prior to decision to test or not.

2.3 SOIL STERILANT

- A. Sterilizer shall be approved by a weed and grass killer that is quick acting, short lived, nonselective, and not dangerous to installer.
- B. The Contractor is to submit a letter with the relevant material submittals certifying that the products used by the Contractor are consistent with the Environmental Safety Policy of San Rafael City Schools.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Establish extent of grading and excavation by area and elevation. Designate and identify datum elevation and project engineering reference points. Set required lines, levels, and elevations.
- B. Do not cover or enclose work of this Section before obtaining required inspections, tests, approvals and location recording.

3.2 EXISTING UTILITIES

- A. Notify the Underground Service Alert (U.S.A.) Center 48 hours in advance of performing any excavation works by calling (800) 227-2600. Verify the grade and location of existing utilities prior to any work where conflicts may arise by careful hand digging. Be responsible for the protection of all existing utilities. Be responsible for the protection of all existing survey monuments.
- B. Before starting grading and excavation, establish the location and extent of underground utilities in the work area. Exercise care to protect existing utilities during earthwork operations. Perform the excavation work near utilities by hand and provide necessary shoring, sheeting, and supports as the work progresses.

- C. Maintain, protect, relocate or extend as required, existing utility lines which pass through the work area. Pay costs for this work, except as covered by the applicable utility companies.
- D. Protect active utility services uncovered by excavation.
- E. Remove abandoned utility service lines from the area of excavation. Cap, plug, or seal abandoned lines and identify termination points at grade level with markers.
- F. Accurately locate and record abandoned and active utility lines rerouted or extended on project record documents.

3.3 SITE GRADING

- A. Perform grading within contract limits, including adjacent transition areas, to new elevations, levels, profiles, and contours indicated. Provide subgrade surfaces parallel to finish surface grades. Provide uniform levels and slopes between new elevations and existing grades.
- B. Grade surfaces to assure areas drain away from structures and to prevent ponding and pockets of surface drainage. Provide subgrade surfaces free from irregular surface changes and as follows:
 - 1. Rough Grading: Plus or minus 0.10 ft. subgrade tolerance. Finish required will be that ordinarily obtained from a laser controlled blade grader operations.
 - 2. Provide subgrade surface free of exposed boulders or stones exceeding 3" in greatest dimension in paved areas, 1" in athletic field areas.
 - 3. Subgrade: Grade subgrade surface smooth and even, free of voids to the required subgrade suitable to receive granular base materials.
 - 4. Drainage Swales: Grade as shown on drawings.

3.4 EXCAVATING

- A. Excavate for structure to elevations and dimensions shown. Extend excavation a sufficient distance from foundations to permit placing and removal of formwork, installation of materials, services and inspection. Hand trim foundation excavations to final grade just before concrete is placed. Remove loose, soft materials, and all organic matter. Footings shall bear on approved undisturbed bearing soil.
- B. Obtain inspection and testing of foundation excavations by the inspector before concrete is placed.
- C. Excavate for structures and paving to cross-sections, elevations and grades indicated. Allow for base material.
- D. Extra Excavation: Excavate unsatisfactory soil materials extending below required elevations to depth a directed. Such extra excavation will be paid for as a change in work. Obtain Architect's written authorization before performing extra excavation work.
- E. Unauthorized excavation: Backfill and fill all overexcavation to proper grades. Fill overexcavation at footings with 1,500 psi concrete. Additional labor and material for unauthorized excavation and remedial work at Contractor's expense.
- F. Shore, sheet or brace excavations as required to maintain them secure. Remove shoring and bracing as backfilling progresses, when banks are safe against caving.

- G. Do not excavate footings or slabs to the full depth when freezing temperature may be expected, unless footings or slabs are placed immediately after the excavation has been completed. Protect excavation bottoms from freezing when the placing of concrete is delayed.

H. Rock Excavating:

1. Rock: Material which cannot be removed with 3/4 cu. yd. capacity power shovel without drilling or solid boulders with a volume of more than 1/2 cu yd.
2. Rock Excavation: Material excavation of buried boulders and rock in excess of 1/2 cu. yd. that requires continuous use of ripper or other special equipment. All other excavation shall be classified as earth excavation.
3. Contractor will be paid cost of rock excavation as a charge in work. Obtain Inspector's written authorization prior to performing rock excavation work.

3.5 BACKFILLING

- A. Obtain inspection and approval of subgrade surfaces by Inspector prior to filling operations. Scarify, dry and compact soft and wet areas; remove and replace unsuitable subgrade materials with an approved compacted fill material. Take corrective measures before placing fill materials.

1. Topsoil is not permitted as fill or backfill material under paved areas.
2. Scarify the upper 6 inches of existing soil before placing any fill. In areas on which concrete, aggregate base, is to be placed, moisture condition and thoroughly mix the scarified material and re-compact to at least 90 percent relative compaction.

- B. Spread approved engineered fill material uniformly in layers not greater than 6" of loose thickness over entire area prior to compaction. Request monitoring of filling and compaction by Geotechnical Engineer.

1. Lift thickness requirements may be modified by Inspector to suit equipment and materials or other conditions when required to assure satisfactory.
2. Moisture-condition fill material to near Optimum Moisture Content by aerating or watering and thoroughly mix material to obtain moisture content permitting proper compaction.
3. Place and compact each layer of fill to indicated density before placing additional fill material repeat filling until proposed grade, profile or contour is obtained.
4. Suspend fill operations when satisfactory results cannot be obtained because of environmental or other unsatisfactory site conditions. Do not use muddy (or frozen) fill materials. Do not place fill material on muddy (or frozen) subgrade surface.
5. Maintain surface conditions which permit adequate drainage of rainwater and prevent ponding of surface water in pockets. When fill placement is interrupted by rain, remove wet surface materials or permit to dry before placing additional fill material.

- C. Place backfill material in uniform layers not greater than 6" loose thickness over entire backfill area.

1. Use hand tampers at foundation retaining walls and similar locations. Do not use large rolling equipment adjacent to retaining walls.

2. Do not backfill against retaining wall until walls for bearing surfaces have reached design strength or are properly braced, and backfilling operations approved. Provide clean backfill materials or granular materials as required/Compact in maximum 6" layers.
- D. Fill all areas of settlement to proper grade before subsequent construction operations are performed.
- E. Compaction:
1. Provide minimum and maximum compaction control for all fill and backfill.
 2. Engineered Fill:
 - a. Compact each layer of engineered fill or backfill material to 90% relative compaction, unless otherwise specified. Extend compaction at least 5'-0" at both sides of foundations and retaining walls and at least 1'-0" beyond slabs on-grade and paving.
 3. Water settling, puddling, and jetting of fill and backfill materials as a compaction method is not acceptable.
 4. Maintain moisture content of materials during compaction operations within required moisture range to obtained indicated compaction density.
 5. Provide proper equipment to achieve consistent and uniform compaction of fill and backfill materials.
 6. Do not use heavy equipment that will over-compact planting soil. Compact topsoil to maximum 85 % relative compaction.
- F. Maintenance of Finished Grades:
1. Protect finished graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and damaged areas.
 2. Where completed areas are disturbed by construction operations or adverse weather, scarify, reshape, and compact or scarify to achieve required density.

3.6 FIELD QUALITY CONTROL

- A. The Owner will provide and pay for field quality control soils testing and inspection during earthwork operations.
- B. Contractor shall provide adequate notice, cooperate with, provide access to the work, obtain samples, and assist testing agency and their representatives in execution of their function.
- C. Fill Materials: The Owner will test proposed materials to verify suitability for use, gradation of material, moisture-density relation, design bearing value, and percent of materials.
- D. Subgrade Surfaces: Based on visual examination of the site, the Owner will provide and pay for bearing tests as required to verify subgrade surfaces are adequate and meet or exceed design bearing values.
1. Paved Areas: Make at least one test for each 2,000 sq. ft. of paved area.

- E. Compaction Operations: The Owner will provide and pay for inspection and testing during paved area filling and compaction operations. Test each lift of fill to verify compaction meets specified requirements. The Owner will provide and pay for periodic inspection and testing during site area filling and compaction operations.
- F. When, during progress of work, filed tests indicate that installed compacted materials do not meet specified requirements, provide additional compaction until specified density is achieved, or remove and replace defective materials with new materials as directed by the inspector. Cost of additional labor, materials, and testing to attain specified density is at Contractor's expense.

3.7 DISPOSAL OF WASTE MATERIALS

- A. Stockpile, haul from site, and legally dispose of export and waste materials, including trash and debris.
- B. Maintain disposal route clear, clean, and free of debris.
- C. Clean excess soil may be distributed on site as accepted by Inspector, if it does not adversely affect specified finish grades. Coordinate with Drawings and Subgrade Preparation & Base Material.

3.8 CLEANING, per Section 31 10 00.

- A. Upon completion of earthwork operation, clean areas within contract limits, remove tools and equipment. Provide a clear, clean site, free of debris and suitable for site work operations.

3.9 CLOSEOUT, per Section 01 77 00.

- A. The Contractor shall engage a California Registered Civil Engineer or licensed Land Surveyor to perform a conformance survey at completion of the project and provide a hard copy of the survey and an AutoCAD copy of the survey as part of the closeout documents.

END OF SECTION

06/08/18

SECTION 32 13 13

CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes Concrete Paving, including the following:
 - 1. Walks (concrete flatwork).
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.
- C. Related Requirements:
 - 1. Section 03 30 00 "Cast-in-Place Concrete" for general building applications of concrete.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.3 REFERENCES

- A. ASTM International:
 - 1. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 2. ASTM C150 - Standard Specification for Portland Cement.
 - 3. ASTM D1557-12e1 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³)
 - 4. ASTM D5035 - 11(2015) - Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method).
- B. California Code of Regulations (CCR): Title 24, Chapter 2-71, Site development Requirements for Handicapped Accessibility.
- C. California Department of Transportation (C.D.T.):
 - 1. Standard Specifications:
 - a. Section 26 Aggregate Bases.
 - b. Section 37 Bituminous Seals.
 - c. Section 39 Asphalt Concrete.
 - d. Section 51 Concrete Structures.
 - e. Section 52 Reinforcement.
 - f. Section 73 Concrete Curbs and Sidewalks.
 - g. Section 90 Portland Cement Concrete.
 - h. Section 92 Asphalts.
 - i. Section 93 Liquid Asphalts.
 - j. Section 94 Asphaltic Emulsions.

2. Traffic Manual.
3. Highway Design.

D. Institute of Transportation Engineers: Transportation and Traffic Engineering Handbook.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Furnish mill test reports on the cement, reinforcement bars, and aggregates, showing compliance with the respective specifications. The Owner's Testing Lab may make concrete test cylinders and slump tests as deemed necessary to determine compliance with the Specifications.

B. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates: For the following, from manufacturer:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Fiber reinforcement.
4. Admixtures.
5. Curing compounds.
6. Bonding agent or epoxy adhesive.
7. Joint fillers.

B. Material Test Reports: For each of the following:

1. Aggregates: Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

1.6 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockups of full-thickness sections of concrete paving to demonstrate typical joints; surface finish, texture, and color; curing; and standard of workmanship.
2. Build mockups of concrete paving in the location and of the size indicated or, if not indicated, build mockups where directed by Architect and not less than 60 inches by 60 inches.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
 - 2. Do not use frozen materials or materials containing ice or snow.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
- C. Hot-Weather Concrete Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
 - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

1.8 GENERAL DESIGN CRITERIA

- A. Walks and Paths: Concrete exterior slabs (walks, terraces, etc.) shall have a pitch of at least 2 percent. (unless otherwise noted on the drawings)

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.2 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- B. Plain-Steel Wire: ASTM A 1064/A 1064M, galvanized.

- C. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.
- D. Tie Bars: ASTM A 615/A 615M, Grade 60; deformed.
- E. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded-wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
- G. Zinc Repair Material: ASTM A 780/A 780M.

2.4 CONCRETE MATERIALS

- A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - 1. Portland Cement: ASTM C 150/C 150M, gray portland cement Type I or II.
- B. Normal-Weight Aggregates: ASTM C 33/C 33M, 3/4-inch maximum size conforming to Section 90 of the C.D.T. Standard Specifications.
- C. Admixtures: No admixtures will be allowed without prior approval of the District.
- D. Water: Potable and complying with ASTM C 94/C 94M.

2.5 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.

2.6 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber, in preformed strips.
 - 1. Filled joints, unless noted otherwise on the Drawings: 1/4-inch thick, the full depth of the concrete section and conforming to Section 51 of the C.D.T. Standard Specifications.
 - 2. Joint filler: Conform to Section 51 of the C.D.T. Standard Specifications for pre-molded expansion joint filler and expanded polystyrene joint filler.
- B. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

- C. Epoxy-Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.7 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.

- B. Concrete Mixtures: Normal-weight concrete.

1. Compressive Strength (28 Days): 3000 psi.
2. Maximum W/C Ratio at Point of Placement: 0.50.
3. Slump Limit: 4 inches, plus or minus 1 inch.

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to Section 90 of the C.D.T. Standards Specifications. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.
1. Completely proof-roll subbase in one direction. Limit vehicle speed to 3 mph.
- C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.2 SURFACE PREPARATION

- A. Scarify earth subgrade to a depth of not less than 6-inches and compact it to 95 percent of maximum density.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 BASE COURSE

- A. Spread and compact base course on prepared subgrade in accordance with CALTRANS Standard Specifications, paragraphs 26-1.04 and 26-1.05.

3.5 FORM CONSTRUCTION

- A. Set forms to required grades and lines, braced and secured. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement. Coat forms with a non-staining form release agent.
- B. Check completed formwork for grade and alignment to following tolerances:
 - 1. Top of forms not more than 1/8-inch in 10-feet.
 - 2. Vertical face on longitudinal axis, not more than 1/4-inch in 10-feet.
- C. Clean forms after each use and coat with form release agent as required to ensure separation from concrete without damage.

3.6 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

3.7 CONCRETE PLACEMENT

- A. General: Comply with requirements of Section 03 30 00 "Cast-in-Place Concrete" unless otherwise indicated.
- B. Do not place concrete until subbase and forms have been checked for line and grade. Moisten subbase if required to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- C. Place concrete by methods that prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for

hand-spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing and joint devices.

- D. Deposit and spread concrete in a continuous operation between transverse joints as far as possible. If interrupted for more than 1/2 hour, place a construction joint.
- E. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations.

3.8 INSTALLATION OF SIDEWALKS AND OTHER FLATWORK

- A. Placing: Place concrete in accordance with Section 03 30 00 "Cast-in-Place Concrete." Strike off and compact the fresh concrete until a layer of mortar has been brought to the surface. Float the surface to grade and cross section with a float not less than 10-feet long and not less than 6-inches wide. Trowel surfaces to a uniform smooth texture free of trowel marks ready to receive final finish as specified below.
 - 1. Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.
- B. Joints: Tool the surfaces of flatwork to provide weakened plane joints in accordance with patterns indicated. Where no pattern is indicated, mark flatwork into rectangles not less than 12-square feet or more than 20-square feet. Use a scoring tool that will leave the corners rounded. Form expansion joints 1/4-inch wide at all returns and opposite expansion joints in curbs. Where curb is not adjacent, form expansion joints at intervals of 60 feet. Fill expansion joints with premolded expansion joint filler as specified in paragraph 2.6.A.
- C. Tolerances: The surface of flatwork shall not vary more than 0.02-foot from a 10-foot straight edge except at grade changes.
- D. Broom Finish: After concrete has been troweled and joints have been formed, use a stiff fiber broom to provide a uniformly straight scored surface at right angles to the general flow of traffic.
 - 1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.9 CURING

- A. Curing: Comply with requirements of Section 03 30 00 "Cast-in-Place Concrete."

3.10 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.
- B. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- C. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement before date scheduled for inspections.

3.11 CLEAN-UP

- A. During the progress of the work and at the completion of the work, remove all trash, debris, etc., from the project site and leave the site clean and in orderly condition.

END OF SECTION

06/06/18

SECTION 32 17 23

PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Painted traffic markings applied to asphalt pavement.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES

- A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the bituminous concrete paving work only to the extent specified by the reference. Refer to Section 01 42 19 for information concerning availability and use of references.

Standard Specifications: State of California, Department of Transportation (CALTRANS) Standard Specifications, 2015, referred to herein as "Standard Specifications".

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Submit certificates of compliance, manufacturer's specifications, and general recommendations for paint.
- B. Shop Drawings: For pavement markings.
 - 1. Indicate traffic pavement markings, colors, and dimensions to adjacent work.
- C. Submittal procedures and quantities are specified in Section 01 33 00.

1.4 REGULATORY REQUIREMENTS

- A. Provide pavement markings meeting the accessibility requirements of the 2016 California Building Code (CBC) Title 24 Part 2 Chapter 11B - Accessibility; and 2010 ADA Standards for Accessible Design.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver paints and paint materials in original sealed containers that plainly show the designated name, batch number, color, and date of manufacture, manufacturer's directions, and name of manufacturer.
- B. Provide storage facilities at the project site for maintaining materials at temperatures recommended by the manufacturer.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply paint when either air or pavement temperature is below 50 degrees F or above 95 degrees F; or when rain, fog, condensation, or temperatures below 50 degrees F are anticipated during the drying period.

PART 2 - PRODUCTS

2.1 PAVEMENT MARKING PAINT

- A. Pavement Marking Paint: Comply with Section 84-3 of the CALTRANS Standard Specifications.

OR

- B. Pavement Marking Paint: Vinyl acrylic type with non-slip texture for use on asphaltic concrete and portland cement concrete, colors as indicated, specified herein, or required by CBC Title 24 Part 2. Acceptable product or equal:
 - 1. Dunn-Edwards Corporation; VIN-L-STRIPE® Interior/Exterior Zone Marking Paint VSZM10.
 - 2. PPG PAINTS; ZoneLine™ Traffic & Zone Marking Paint (11-53 White; 11-55 Handicap Blue).
- C. Colors: As indicated on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.
- B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean and prepare surfaces to receive traffic paint in accordance with Caltrans Standard Specifications Section 84-3.05 and these special provisions. Where required, remove existing striping and markings by wet blasting or equivalent method. Do not use dry sandblasting or other dust producing methods.
- B. Do not apply pavement-marking paint until layout, colors, and placement have been verified with the Architect.
- C. Allow paving to age for a minimum of 30 days before starting pavement marking.
- D. Immediately before applying the paint, thoroughly clean the pavement surface of dust, dirt, sand, scale, water, oil, grease or other objectionable matter. Do not use solvent material that will damage pavements as cleaning agents. Immediately before painting, give pavement surfaces a final cleaning by means of a power broom and a power blower using compressed air following the brooming.
- E. Provide warning devices required to protect the painting operations and the finished work.

3.3 PAVEMENT MARKING

- A. Machine-apply traffic marking in accordance with Section 84-3 of the CALTRANS Standard Specifications.

OR

- B. Equipment: Apply the traffic and parking striping with a traffic stripe-painting machine with a compressor capacity of at least 105 cubic feet and capable of operating at an air pressure of 125 psi. Mechanically agitate paint while the machine is in operation. Equip the striping machine with a pointer so designed that the machine will hold exactly to the alignment. Equip the propelling vehicle with a speedometer or tachometer, and with a suitable device for determining the quantity of paint in the container. Thoroughly clean the paint container and spray nozzles on the machine before starting each day's work.

1. Where the configuration or location of a traffic stripe is such that a striping machine is not suitable, use hand spraying equipment and stencils or templates.

- C. Application: Immediately following the preparation of the pavement surface, apply the striping at the rate of 100 to 110 square feet per gallon of paint. Apply lines 4 inches wide unless otherwise indicated. Apply the stripe of the indicated or specified width, with clean true edges and without sharp breaks. Repaint, to the applicable specifications, portions of the stripe damaged by any type of traffic within 24 hours after the stripe has been applied.

- D. Tolerances: Apply striping within a tolerance of 1/2 inch in 50 feet. Apply markings and stripings to the widths indicated within a tolerance of 1/4 inch on straight sections and 1/2 inch on curved sections.

- E. At completion touch up stripes and markings which are not clear and distinct or which are not uniform in color.

3.4 PROTECTING AND CLEANING

- A. Permit no surface traffic until pavement and symbol marking has dried thoroughly.
- B. Protect pavement markings from damage and wear during remainder of construction period.
- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

06/06/18

SECTION 33 40 00

STORM DRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Foundation drainage, sub-drainage, and underground storm drainage systems complete with cleanouts, catch basins, inlets, manholes, piping, and connection of the roof drain lines shown on the Building drawings.
- B. Related Documents: The Conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.2 REFERENCES

- A. The editions of the specifications and standards referenced herein, published by the following organizations, apply to the work only to the extent specified by the reference.
- B. American Association of State Highway and Transportation Officials (AASHTO).
- C. American Society for Testing and Materials (ASTM International).

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's catalog cuts of pipe, fittings, joints and couplings; hydrants; meters; valves; and valve boxes.
- B. On a set of Contract Drawings, kept at the site during construction, mark construction that is installed differently from that indicated. Locate materials installed underground by dimensions from fixed identifiable points whether installed as indicated or not.
- C. Submittal procedures and quantities area specified in Section 01 33 00.

1.4 REGULATORY REQUIREMENTS

- A. Materials and installation shall be in accordance with the following documents hereinafter referred to as the "Standard Specifications".
- B. City of San Rafael public Works Standards and Specification.

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Delivery and Storage: Do not store materials directly on the ground. Support the pipe uniformly during shipping and storage. Do not stack higher than 4 feet nor stack with weight on bells. Cover plastic pipe to protect it from sunlight. Keep inside of pipe and fittings free of dirt and debris. Avoid scratching the pipe surface.
- B. Do not install pipe that is cracked, broken, gouged, scratched or forming a clear depression. Remove damaged pipe from the site.

- C. Take special care to avoid injury to coatings and lining on pipe and fittings; make satisfactory repairs if coatings or linings are damaged. Hoist pipe with mechanical equipment using a cloth belt sling or continuous fiber rope which avoids scratching the pipe. Pipes may be lowered by rolling on two ropes controlled by snubbing.

PART 2 – PRODUCTS

2.1 STORM DRAIN LINES

- A. Polyvinyl Chloride (PVC) Sewer Pipe and Fittings: Comply with Section 207-17 of the Standard Specifications.

2.2 FOUNDATION AND SUBSURFACE DRAIN PIPE

- A. Perforated Corrugated Polyethylene Pipe: ASTM F667-16, may be used where height of fill above pipe does not exceed 8 feet.
- B. Perforated Polyvinyl Chloride (PVC) Pipe: ASTM D 3034-16, SDR 26, may be used where height of fill above pipe does not exceed 35 feet.

2.3 CULVERTS

- A. Corrugated Steel Pipe and Coupling Bands: accordance with AASHTO M-190.

2.4 RELATED MATERIALS

- A. Precast Concrete Units: Catch basins and inlets shall meet the requirements of ASTM C913-16 and manhole sections shall meet the requirements of ASTM C 478-18 except that portland cement shall be Type II, low alkali.
- B. Castings: Manufacture castings true to pattern free from blowholes, porosity, hard spots, shrinkage distortion or other defects. Castings shall be of grey iron, ductile iron or steel as indicated or as required to withstand loadings.
 - 1. Grey Iron Castings: Meet the requirements of ASTM A 48-03, Class 35.
 - 2. Ductile Iron Castings: Meet the requirements of ASTM A 536-84, Grade 60-40-18.
 - 3. Steel Castings: Meet the requirements of ASTM A 27-95 for mild to medium strength castings and ASTM A 148-15a for high strength castings.
- C. Fabricated Steel Gratings and Frames: Fabricate from steel meeting the requirements of ASTM A 36-14 or ASTM A 576-17, Grades 1021, 1022, 1026, 1029 or 1030. Welding shall meet the requirements of AWS 01.1-96. Burrs, rough and sharp edges, and other flaws shall be removed. Warped pieces shall be straightened after all fabrication. No grating shall have openings greater than W' in any direction.
- D. Painting: Castings and steel fabrications shall be given one coat of bituminous paint.
- E. Concrete Appurtenances: Concrete for catch basins and manholes shall be 2500 psi at 28 days and conform to Section 03 30 00.
- F. Filter Fabric: Provide nonwoven polyester fabric. Acceptable products include, but are not limited to, the following or equal:

Crown Zellerbach; Fibertex 200
Celanese Fibers; Mirafi 140
DuPont; Typar

- G. Filter Material: Clean coarse sand and gravel or crushed stone 3/4 inch minimum to 1-1/2 inch maximum, free draining.

PART 3 – EXECUTION

3.1 TRENCHING

- A. Trenching is specified in Section 31 23 33.
- B. Trench bottom shall be accurately graded to provide uniform bearing and to support pipe, and a uniform slope of not less than 0.2 percent unless otherwise indicated. Excavate for pipe hubs. Remove unsuitable soils or rock to depths deemed necessary.

3.2 CONNECTIONS TO APPURTENANCES

- A. Where pipe connects into catch basin inlet or manhole walls, sleeves may be installed in the forms; after the forms are removed, the pipe shall be dry packed in place.

3.3 INSTALLATION OF SUBSURFACE DRAINS

- A. Bedding: Line the trench with filter fabric with joints in fabric lapped not less than 4 inches. Cover the bottom of the trench, full width, with 4 inches of filter material.
- B. Pipe laying: lay pipe with perforations at the bottom and with sections joined with couplings that will hold pipe firmly in place without the use of sealing compounds or gaskets. Cutting and machining of asbestos pipe shall be done in accordance with OSHA and local Air Pollution Control District regulations.
- C. Backfilling: Place filter material over the pipe to the height indicated and wrap filter fabric over the top of the material. Backfill and compact remainder of the trench in accordance with Section 31 23 33.

3.4 INSTALLATION OF STORM DRAINS

- A. Pipe laying: Keep trenches dry and free of rocks, clods and other unsuitable material during laying and bedding operations. Open ends of pipe shall be closed temporarily at the end of each days work using wood blocks or bulkheads.
 - 1. Asbestos Cement Pipe: Install pipe in accordance with manufacturer's directions using compressive polyvinyl gaskets. Cutting and machining of asbestos pipe shall be done in accordance with OSHA and local Air Pollution Control District regulations.
 - 2. ABS Composite Pipe: Install pipe and make solvent welded joints in accordance with pipe manufacturer's directions.
 - 3. Polyvinyl Chloride Pipe: Install pipe in accordance with manufacturer's directions using solvent welded joints.

4. Reinforced Concrete Pipe: Provide proper facilities for lowering pipe into trenches. lay pipe with groove ends in upgrade direction. Adjust tongues in grooves to give a uniform space all around. Use compressive polyvinyl gaskets in accordance with manufacturer's directions or mortar joints of 1 part portland cement to 2 parts sand with sufficient water to give mix a stiff consistency. Retempering of mortar will not be permitted.
- C. Backfilling: Do not backfill until elevations and dimensions of pipe are recorded on the Record Drawings. Backfilling and compaction are specified in Section 31 23 33.

3.5 INSTALLATION OF CULVERTS

- A. Handle pipe carefully so as not to damage bituminous coating. If coating is damaged, give damaged areas an application of bituminous material equal to that specified for the pipe. Make joints using coupling bands furnished with the pipe. Keep space between pipe and couplings free from dirt so that corrugations will fit snugly. While tightening the bands, tap them with soft-head mallet to take up the slack and ensure a tight joint. Backfill and compaction are specified in Section 31 23 33.

END OF SECTION

06/08/18