TITLE SHEET 2123

PROJECT MANUAL FOR

THOMAS JEFFERSON MIDDLE SCHOOL KITCHEN REMODEL

MADERA UNIFIED SCHOOL DISTRICT 1902 HOWARD ROAD MADERA, CA 93637

PREPARED BY:

DARDEN ARCHITECTS, INC.ARCHITECTURE•PLANNING•INTERIORS
6790 N. WEST AVENUE
FRESNO, CALIFORNIA 93711

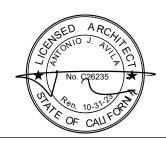
IDENTIFICATION STAMP DIV. OF THE STATE ARCHITECT

APP: 02-120517 INC:

REVIEWED FOR

SS 🗹 FLS 🗹 ACS 🗹

DATE: 04/25/2023



ARCHITECT:



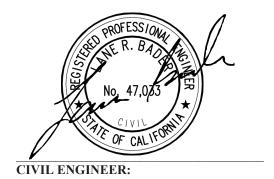
STRUCTURAL ENGINEER:



MECHANICAL ENGINEER:



ELECTRICAL ENGINEER:



END OF SECTION

INTENTIONALLY LEFT BLANK

PROJECT MANUAL TABLE OF CONTENTS

PROCUREMENT AND CONTRACTING REQUIREMENTS GROUP

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

INTRODUCTORY INFORMATION

00 01 01 PROJECT TITLE PAGE

00 01 10 PROJECT MANUAL TABLE OF CONTENTS

00 23 13.03 SUPPLEMENTARY INSTRUCTIONS FOR BIDDERS

PROCUREMENT REQUIREMENTS

Provided by Owner

CONTRACT REQUIREMENTS

Provided by Owner

SPECIFICATIONS GROUP

GENERAL REQUIREMENTS SUBGROUP

DIVISION 01 – GENERAL REQUIREMENTS

01 11 13	SUMMARY OF WORK
01 21 13	ALLOWANCES
01 25 00	SUBSTITUTION PROCEDURES
01 29 73.01	SCHEDULE OF VALUES
01 31 13	CONTRACTOR'S "PROJECT MANAGEMENT" AND COORDINATION
01 32 16.01	CONSTRUCTION SCHEDULES
01 32 26	FORMS AND REPORTS
01 33 00	SUBMITTAL PROCEDURES
01 35 16	ALTERATION PROJECT PROCEDURES
01 41 00	REGULATORY REQUIREMENTS
01 42 00	REFERENCES
01 45 23	TESTING AND INSPECTING SERVICES
01 45 29	TESTING LABORATORY SERVICES
01 50 00	TEMPORARY FACILITIES AND CONTROLS
01 64 00	OWNER-FURNISHED ITEMS
01 71 23	FIELD ENGINEERING
01 73 29	CUTTING AND PATCHING
01 77 20	PROJECT CLOSEOUT
01 78 36	WARRANTIES
01 78 39	PROJECT DOCUMENTS

FACILITY CONSTRUCTION SUBGROUP

DIVISION 02 – EXISTING CONDITIONS

02 49 19 SELECTIVE DEMOLITION

DIVISION 03 – CONCRETE

03 11 01 CONCRETE FORMWORK 03 15 14 DRILLED ANCHORS

03 20 00	REINFORCEMENT
03 30 00	CAST-IN-PLACE CONCRETE
03 35 10	POLISHED CONCRETE FINISHING

DIVISION 05 – METALS

05 12 00 STEEL AND FABRICATIONS

DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES

06 10 00	ROUGH CARPENTRY
06 41 23	MODULAR CASEWORK

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

07 21 00	INSULATION
07 51 13	BUILT-UP ROOFING
07 60 00	SHEET METAL
07 72 00	ROOF ACCESSORIES
07 92 00	SEALANTS

DIVISION 08 – OPENINGS

08 11 00	METAL DOORS AND FRAMES
08 31 13	ACCESS DOORS AND FRAMES
08 33 00	COILING DOORS
08 70 00	HARDWARE
08 80 00	GLASS

DIVISION 09 – FINISHES 09 24 00 CEMENT DI ASTER

09 24 00	CEMENT PLASTER
09 29 00	GYPSUM BOARD
09 30 00	TILE
09 50 00	ACOUSTICAL CEILINGS
09 65 10	RESILIENT BASE AND ACCESSORIES
09 67 23	RESINOUS FLOORING
09 72 00	WALL COVERINGS
09 91 00	PAINTING

DIVISION 10 – SPECIALTIES

10 05 00	MISCELLANEOUS SPECIALTIES
10 14 00	IDENTIFYING DEVICES
10 14 53	ROAD AND PARKING SIGNAGE
10 21 13	TOILET PARTITIONS
10 44 00	FIRE PROTECTION SPECIALTIES
10 51 13	METAL LOCKERS

DIVISION 11 – EQUIPMENT

11 40 00 FOOD SERVICE EQUIPMENT

FACILITY SERVICES SUBGROUP

DIVISION 22 – PLUMBING

22 00 00 PLUMBING

DIVISION 23 – HEATING VENTILATING AND AIR CONDITIONING

	23 00 00	GENERAL MECHANICAL PROVISIONS	
--	----------	-------------------------------	--

23 00 01 HEATING, VENTILATING AND AIR CONDITIONING

23 09 23 DIRECT DIGITAL CONTROL AND ENERGY MANAGEMENT SYSTEM

DIVISION 26 – ELECTRICAL

26 05 00	COMMON WORK RESULTS FOR ELECTRICAL
26 05 26	GROUNDING
26 05 53	ELECTRICAL IDENTIFICATION
26 20 00	LOW VOLTAGE ELECTRICAL TRANSMISSION
26 50 00	LIGHTING FIXTURES

DIVISION 27 – COMMUNICATIONS

27 00 00	TELECOMMUNICATION SYSTEMS
27 05 28	COMMUNICATIONS INFRASTRUCTURE SYSTEM
27 10 00	STRUCTURED CABLING SYSTEM

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

28 31 00 FIRE DETECTION AND ALARM

SITE AND INFRASTRUCTURE SUBGROUP

DIVISION 31 – EARTHWORK

31 20 00 EARTHWORK 31 22 22 SOIL MATERIALS

APPENDICES

APPENDIX "A" - INTERIOR COLOR SCHEDULE

END OF SECTION

INTENTIONALLY LEFT BLANK

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

SECTION 002213.03 – SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Supplementary Instructions to Bidders consisting of procedures and conditions for the use of documents of various types and formats for bidding of this project.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.

1.2 DEFINITIONS

- A. Hard Copy Format: Documents printed on paper medium.
- B. Electronic Image Format: Electronic Files consisting of Bid Documents in an image format such as PDF's, TIFF's and etc. These files are to be READ ONLY.

1.3 SUBMITTALS

- A. Submit in accordance with the following:
 - 1. Bidder's Usage Agreement for Bid Documents:
 - a. Hard Copy Format Form.
 - b. Hard Copy and Electronic Image Format Form.
 - 2. Bidder's Usage Agreement for Partial Documents.
 - a. Partial Bid Documents Form.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 SCHEDULES:

A. BIDDER'S USAGE AGREEMENT FOR BID DOCUMENTS:

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

- 1. HARD COPY FORMAT: When the Bid Documents are being issued in a printed medium, the HARD COPY FORMAT FORM shall be used.
 - a. This form shall be submitted and signed as a condition of receiving Bid Documents.
- 2. HARD COPY AND ELECTRONIC IMAGE FORMAT: When the Bid Documents are being issued electronically, the HARD COPY AND ELECTRONIC IMAGE FORMAT FORM shall be used.
 - a. This form shall be submitted and signed as a condition of receiving Bid Documents.
- B. BIDDER'S USAGE AGREEMENT FOR PARTIAL BID DOCUMENTS.
 - 1. When the Bidder is requesting additional documents which are part of the Bid Documents, the PARTIAL BID DOCUMENTS FORM shall be used.
 - a. This form shall be submitted and signed as a condition of receiving Partial Bid Documents.

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

|--|

Project Name:	
DA Project No.:	
Ι,	, as duly authorized agent of
	("Bidder") as prospective bidder on the above
named project ("Project") is requesting a copy of the	project BID DOCUMENTS (bidding requirements
contract requirements, specifications, contract drawin	gs, resource drawings if any, and addenda to date).

- A. Bidder is being provided copies of Bid Documents for the Project in a Hard Copy Format, acknowledges that Bid Documents are being provided as the official record set of documents issued for bidding. It is the Bidder's responsibility to review and obtain all information from the Bid Documents necessary for a complete and accurate bid. This request is subject to the following conditions, which the Bidder hereby agrees to abide by:
- B. Bidder shall pay a refundable deposit for the Bid Documents in the amount of \$_____ per set. In the event the Bidder is not the successful bidder, the bidder agrees to return all Bid Documents within 15 calendar days after the bid date. If the Bid Documents are not returned within 15 calendar days after the bid date, the Bidder will forfetit the deposit.
- C. Bidder acknowledges that these Bid Documents will be re-issued as Construction Documents following the bid. The Bidder agrees to return all Bid Documents in "Good Condition" with all the sheets unmarked and in their original order. The returned Bid Documents will be reviewed and the condition of the Bid Documents will be determined. If the Bid Documents are determined to be in "Good Condition", the Bidder's Deposit will be returned.
- D. In the event that the Bid Documents are returned and are not in "Good Condition", the Bidder understands that the Architect and Architect's Consultants will incur certain costs in replacement of missing items and to repair the Bid Documents to their original condition, in order to be issued as Construction Documents. The bidder agrees to pay the Design Team a service fee of \$105.00 an hour (with a two-hour minimum of \$210.00). The service fee will be deducted from the Bidder's deposit, and the remainder refunded to the Bidder.
- E. Bidder understands and agrees the Bid Documents are instruments of Architect's and Architect's Consultants' ("Design Team") professional service and are intended for one-time use by Bidder in the bidding of the Project. All information contained in the Bid Documents are and shall remain the property of the Design Team, who is deemed to be the author of the drawings and data, and the Design Team shall retain all common law, statutory law, and all other rights, including copyrights, with respect to Bidder.
- F. The Bidder shall indemnify and hold harmless, the Design Team, its officers, directors, employees or subcontractors, to the fullest extent permitted by law, against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees and defense costs arising out of or resulting from Bidder or any other person or entity that gains information from the Bid Documents or copies any part of the Bid Documents, or uses the Bid Documents or copies any part of the Bid Documents, for purposes other than the bidding of this project, and will be liable to the Design Team for fees equal to the fees paid by the client pursuant to developing the documents for this project.

0000

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

DARDEN ARCHITECTS, INC.		
Number of Sets Requested:		
Print Name (Bidder)	Title	
Signature	Date:	

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

3.3 BIDDER'S USAGE AGREEMENT FOR BID DOCUMENTS HARD COPY AND ELECTRONIC IMAGE FORMAT

Project Name:	
DA Project No.:	
I,	, as duly authorized agent of
	("Bidder") as prospective bidder on the above named
project ("Project") is requesting a copy o	of the project BID DOCUMENTS (bidding requirements, contract
requirements, specifications, contract dra	awings, resource drawings if any, and addenda to date).

- A. Bidder is being provided copies of Bid Documents for the Project, which consists of two parts. One part of the Bid Documents is in the Hard Copy Format ("HCF") and the other part is in the Electronic Image Format ("EIF") on CD-ROM. Bidder acknowledges that HCF Documents and the EIF Documents are being provided as the official record set of documents issued for bidding. It is the Bidder's responsibility to review and obtain all information from both the HCF and the EIF documents necessary for a complete and accurate bid. This request is subject to the following conditions, which the Bidder hereby agrees to abide by:
- B. Bidder shall pay a non-refundable deposit for the Bid Documents in the amount of \$_____. In the event the Bidder is not the successful bidder, the bidder agrees to permanently dispose of the HCF and EIF on the Project CD-ROM.
- C. Bidder acknowledges that neither the EIF documents nor the CD-ROM will be updated by the Design Team. The CD-ROM contains the original documents and will not be updated regardless of when Bidder obtains the CD-ROM. Any changes to the contract documents will be issued as a separate document.
- D. Bidder is further warned that while the EIF information appears to be extremely accurate, this apparent accuracy is an artifact of the techniques used to generate it and is no way intended to imply actual accuracy. The Bidder acknowledges and takes full responsibility for the accuracy, correctness of measurements, areas, inventories derived, conclusions drawn, and information extracted from the EIF documents.
- E. Bidder understands and agrees the HCF and EIF documents are instruments of Architect's and Architect's Consultants' ("Design Team") professional service and are intended for one-time use by Bidder in the bidding of the Project. All HCF and EIF documents are and shall remain the property of the Design Team, who is deemed to be the author of the drawings and data, and the Design Team shall retain all common law, statutory law, and all other rights, including copyrights, with respect to Bidder.
- F. The Bidder shall indemnify and hold harmless, the Design Team, its officers, directors, employees or subcontractors, to the fullest extent permitted by law, against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees and defense costs arising out of or resulting from Bidder or any other person or entity that gains information from the Bid Documents or copies any part of the Bid Documents, or uses the Bid Documents or copies any part of the Bid Documents, for purposes other than the bidding of this project, and will be liable to the Design Team for fees equal to the fees paid by the client pursuant to developing the documents for this project.

0000

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

Description of the HCF Documents and the EIF Documents on CD-ROM, provided:

Print Name (Bidder)

Title

Signature

Date:

DARDEN ARCHITECTS, INC.

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

3.4 BIDDER'S USAGE AGREEMENT FOR PARTIAL BID DOCUMENTS

Project Name:	
DA Project No.:	
Ι,	, as duly authorized agent of
	("Bidder") as prospective bidder on the above named
project ("Project")	The Bidder acknowledge having received at least one (1) complete set of the
Bid Documents fo	the subject project and all Addenda issued to date in either Hard Copy Format
("HCF") and/or an	Electronic Image Format ("EIF").

- A. The Bidder is requesting partial copies of the Bid Documents ("Partial Documents") in the format originally issued and that was prepared by the Architect and/or Architect's Consultants ("Design Team") on the subject Project, so that the information therein may be utilized in the Bidder's work on the same project. The Partial Documents are strictly intended for the Bidder's convenience and are not recognized as part of the official record set of Bid Documents issued for bidding. This request is subject to the following conditions, which the Bidder hereby agrees to abide by:
- B. The Bidder shall pay for all costs in reproducing the requested Partial Documents directly to the Printers. In the event that the Bidder is not the successful bidder, the Bidder agrees to permanently dispose of the Partial Documents.
- C. The Bidder recognizes that the value of the Partial Documents far exceeds the cost of printing. The Bidder further agrees that the Bidder will make no other copies of the Partial Documents. Any copying, and/or reuse of the Partial Documents without written authorization of Darden Architects, Inc. is prohibited.
- D. The Bidder understands that the accuracy of the information is an artifact of the techniques used to generate it and is in no way intended to imply actual accuracy. The Bidder agrees that by using these Partial Documents, the Bidder is in no way relieved of the responsibility to review and obtain all information from the complete set of the Bid Documents necessary for a complete and accurate bid.
- E. The Bidder understands and agrees to that any documents provided are instruments of the professional service by the Design Team and are intended for one-time use solely in the bidding of this Project. They shall remain the property of the Architect or the Architect's Consultants, who is deemed to be the author of the documents and who shall retain all common law, statutory law, and all other rights, including copyrights, with respect to the Bidder.
- F. The Bidder shall indemnify and hold harmless, the Design Team, its officers, directors, employees or subcontractors, to the fullest extent permitted by law, against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees and defense costs arising out of or resulting from Bidder or any other person or entity that gains information from the Partial Documents or copies the Partial Documents, or uses the Partial Documents or copies the Partial Documents, for purposes other than the bidding of this project, and will be liable to Design Team for fees equal to the fees paid by the client pursuant to developing the documents for this project.

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

G. In the event that the Bidder is a successful bidder, the Bidder agrees that all Bid Documents issued to the Bidder, and Partial Documents obtained by the Bidder, along with any other documents utilized by the Bidder in preparing the bid, will be included in the Escrow Bid Documents when required by the General Conditions. Any and all documents prepared and issued by the Design Team, which are included as part of the Escrow Bid Documents, will be returned to Darden Architects, Inc. at the close of escrow.

Signature	Dated:	
Print Name, (Bidder)	Title	
Description of the requested documents:		
DARDEN ARCHITECTS, INC.		

END OF SECTION

SECTION 011113 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Work included: Construction of the work for Thomas Jefferson Middle School Food Service Remodel, **Madera**, California. The work is defined as all material, labor, equipment and services necessary to do all work shown on the drawings and called for in the Specifications. The Work shall be as indicated on the Contract Documents.
- B. This Section includes the following:
 - 1. Summarizes the Work of the Contract.
 - 2. Establishes requirements governing the Work.
 - 3. Identifies the Work that will be performed under separate contracts and the coordination.
 - 4. Project Site access.
 - 5. Restrictions under which the project will be constructed.
- C. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 DEFINITIONS

A. The words "OWNER" and "DISTRICT" are synonymous and interchangeable, when used throughout this Project Manual.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES.
 - 1. Quality Assurance/Control Submittals:
 - a. Certificates:
 - 1) Submit three (3) copies of certificates indicating compliance with the Asbestos Hazard Emergency Regulations Act.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Contractor's Qualifications:
 - a. Contractor shall have experience and have successfully completed three (3) projects of similar scope and size to that indicated for this project.
 - b. Contractor shall have demonstrated that they have the resources to perform all of the requirements of this project.
- B. Regulatory Requirements:

- Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of Work, and in accordance with Specification Section - REGULATORY REQUIREMENTS:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the Project is located.

C. Certifications:

 The Contractor shall certify in writing that no materials containing Asbestos are incorporated in the work, in accordance with the Asbestos Hazard Emergency Regulations Act.

D. Contractor's Duties:

- 1. Except as specifically noted, provide and pay for:
 - a. Labor, material and equipment.
 - b. Tools, construction equipment and machinery.
 - c. Heat and utilities required for construction. See Specification Section TEMPORARY FACILITIES AND CONTROLS.
 - d. Other facilities and services necessary for proper execution and completion of Work.
- 2. Pay legally required sales, consumer and use taxes.
- Secure and pay for all site specific as necessary for proper execution and completion of Work
 - a. Licenses.
 - b. Permits and Fees.
 - c. Government Fees.
 - d. Royalties.
- 4. Give required notices.
- 5. Promptly submit written notice to Architect of observed variance.
- 6. Enforce strict discipline and good order among employees. Do not employ on Work:
 - a. Unfit persons.
 - b. Persons not skilled in assigned task.

1.5 WORK UNDER OTHER CONTRACTS

A. General Requirements:

- 1. Work under separate contracts will occur throughout the duration of the project. The work being installed under separate contracts will occur around adjacent to the Contract project site.
- 2. Contractor shall coordinate its work with the work under separate Contracts and shall cooperate with the Contractors of these separate Contracts as they occur.
- 3. Should the Contractor damage and/or otherwise alter work installed under separate contracts, the Contractor is responsible for the repair and/or correction of installed work.
- 4. Prior to the installation of the Work, coordinate the work installed or to be installed by separate contracts relative to this project scope of work.

B. Work by Owner:

- 1. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this contract or work by Owner. Coordinate the work of this Contract with work performed by Owner.
- 2. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be constructed simultaneously with work under this Contract.

- a. Items that are Owner Furnished Contractor Installed and Owner Furnished Owner Installed as indicated on the Contract Drawings and as defined in Specification Section OWNER FURNISHED ITEMS.
- 3. Security and Intrusion Alarm System: Owner's Vendor will design the Intrusion Alarm System and identify pathways that need to be provided under the Contractor's Construction Contract.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

A. Access to Site:

- 1. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of the Project.
- 2. Contractor shall be responsible for coordinating access to and from the site throughout the duration of the project. Access to and from the site may vary, based upon timing and duration of separate contracts.
- 3. The Contractor shall not use the Off-Site areas, with the exception of the Site Access per Specification Section TEMPORARY FACILITIES AND CONTROLS, and shall not interfere with the work in these areas.

B. Contractor Use of Premises:

- 1. Confine operations at sites to areas permitted by:
 - a. Laws.
 - b. Ordinances.
 - c. Permits.
 - d. Contract Documents.
- 2. Do not unreasonably encumber site with materials or equipment.
- 3. Assume full responsibility for protection and safekeeping of Contractor's and Owner's material stored on premises, and keep the site and building secure at all times.
- 4. Obtain and pay for use of additional storage Work areas needed for operations.
- 5. Limit use of Site Work and storage.

1.7 SCHEDULING

- A. The Work of this Project will be constructed under a single contract.
 - 1. It is anticipated that the start of construction will be around:
 - a. May 15th, 2023.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 012113 - ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all allowance materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - 2. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by CHANGE ORDER.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
- C. Allowances (Types):
 - 1. Lump-sum allowances.

1.2 DEFINITIONS

- A. Lump-Sum Allowances:
 - 1. Allowance shall include cost to Contractor of specific products and materials ordered under allowance and shall include taxes, freight, and delivery to Project site.
 - 2. Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.3 SYSTEM DESCRIPTION

- A. Selection and Purchase:
 - 1. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
 - 2. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
 - 3. Purchase products and systems selected by Architect from the designated supplier.

1.4 SUBMITTALS

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

- 1. Although not considered a CHANGE ORDER, submit proposals for purchase of products or systems included in allowances, in the form specified for a CHANGE ORDER.
- 2. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- 3. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 QUALITY ASSURANCE

A. Meetings:

- 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems, which may impede issuance of warranties or guaranties.
 - b. Maintaining installed work until the Notice of Substantial Completion has been filed.

1.6 SEQUENCING AND SCHEDULING

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.7 MAINTENANCE

- 1. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - a. If requested by Architect, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Architect, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

PART 2 - PRODUCTS

NOT APPLICABLE

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.

3.3 SCHEDULES

- A. Allowance No. 1 \$100,000.00 (to be confirmed with District):
 - 1. Includes: Owner's Allowance as specified in the Front End documents.

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Work that is substituted for Work specified in DIVISIONS 02 through 49 shall meet the requirements of this Section.
 - 2. Provide all material, labor, equipment and services necessary to completely install all approved substituted materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - 3. See the INSTRUCTIONS TO BIDDERS or the GENERAL CONDITIONS for any time limits set for the submittal of substitutions.
 - 4. Substitutions can be requested in two ways: a. "Prior to Bid Opening", and b. "After Award of the Contract":
 - a. "Prior to Bid Opening": The Contractor or Bidder must insure that proposed substitutions of materials by the Contractor or Bidder are submitted to the Architect's office no later than fourteen (14) calendar days prior to the Bid Opening for review and possible approval of any equipment or materials thought to be equal to or better than those specified in the drawings or specifications. An Addendum will be issued no later than three (3) calendar days prior to Bid Opening including all equipment and materials deemed equivalent to those specified and approved by the Architect.
 - b. "After Award of the Contract": In accordance with the provisions of Section 3400 of the California Public Contract Code, the Contractor awarded the Contract will be provided a period of thirty-five (35) calendar days after the award of the Contract for submission of data substantiating a request for a substitution of "an equal" item or items.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 DEFINITIONS

- A. Claimant: Bidder, Sub-Contractor, Contractor, Distributor, Supplier, Manufacturer or other entity that is submitting a claim for a substitution.
- B. Substitutions: Substitutions are not a part of the Submittal Process described in Specification Section SUBMITTAL PROCEDURES. Substitution Requests by a claimant must be reviewed and approved by the Architect before any submittal will be accepted. It is the claimant's responsibility to provide clear and concise documentation to expedite the Architect's review. If the Substitution Request requires re-submission(s) due to the Claimant's inadequate documentation, no time extension will be allowed.

- C. "Or Equal" / "Or Approved Equivalent": Claimant shall request a substitution in accordance with this Specification Section SUBSTITUTION PROCEDURES.
- D. The Project Manual employs the following methods of specifying products. Claimant shall conform to the directives below for this Project:
 - 1. Product, system or design specified only by reference standards:
 - a. Select any product, system or design meeting reference standards.
 - 2. Product, system or design specified by naming several products, systems, designs and/or manufacturers:
 - a. Select any product, system, design and/or manufacturer named.
 - 3. Product, system or design specified by naming several products, systems and/or manufacturers and reference standards:
 - a. Products, systems, designs and/or manufacturer names indicate products, systems, designs and/or manufacturers that (in the Architect's opinion) meets the reference standards.
 - b. Select any of the named manufacturer's products, systems or designs meeting the reference standards.
 - 4. Product, system or design specified by naming one or more products, systems, designs and stating "or equal to", "or approved equivalent" with the specified products, systems or designs:
 - a. Select product, system or design specified, "or approved equivalent".
 - 5. Product, system or design specified by naming only one product, system or design:
 - a. Select product, system or design specified, "or approved equivalent".
 - 6. Product, system or design specified by naming only one product, system or design and followed by the statement "DISTRICT STANDARD NO SUBSTITUTIONS":
 - a. Provide product, system or design specified. No substitutions allowed.
- E. Cost to Claimant for review of Substitution Request:
 - 1. Each review of a Substitution Request by the Architect and/or it's Consultant(s) will be billed to the Claimant at an hourly rate of \$212.00 an hour, two hour minimum for each review, whether approved or rejected.
 - a. Waiver of review fees:
 - 1) When the product has been discontinued or is unavailable.
 - a) EXCEPTION: Where the claimant has failed to order in a timely manner and waits until the last minute, no consideration of the waiver of fees will be allowed; no time extensions will be allowed.
 - 2) When the Owner has requested a substitution.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section INSTRUCTIONS TO BIDDERS:
- B. Content of Request:
 - 1. Check made payable to DARDEN ARCHITECTS, INC. for the minimum two hour review period for \$424.00, non-refundable.
 - a. When additional time is required to review a substitution request beyond the first two hours, the Architect or its consultants will bill the claimant for the time expended in the review process.
 - 2. Complete the attached **SUBSTITUTION REQUEST FORM** substantiating compliance of proposed substitution with Contract Documents. **NO OTHER FORMS WILL BE ACCEPTED.**

- 3. Attach to the SUBSTITUTION REQUEST FORM an itemized comparison of proposed substitution with product, system or design specified.
- 4. For products or systems, attach to the SUBSTITUTION REQUEST FORM:
 - a. Product, system or design identification, including manufacturer's name and address.
- 5. Manufacturer's product information: MUST BE HIGHLIGHTED AND PROJECT SPECIFIC. SUBMITTALS NOT ADEQUATELY MARKED-UP ACCORDING TO PROJECT SPECIFICS WILL BE REJECTED:
 - a. Literature including product, system or design description, performance and test data and reference standards.
 - b. Samples.
 - c. Warranties.
- 6. For construction methods, attach to the SUBSTITUTION REQUEST FORM:
 - a. Detailed description of proposed methods.
 - b. Drawings illustrating methods.
- C. Submit three (3) copies of Substitution Request including all attached data.

1.4 QUALITY ASSURANCE

A. Qualifications:

- 1. Product, system or design qualifications:
 - a. In making a request for substitution, Claimant certifies that:
 - 1) Claimant has personally investigated proposed product, system or design, and determined that it is equal or superior in all respects to that specified.
 - 2) Claimant shall provide the same guarantee or warranty for substitution as for product, system or design specified.
 - 3) Claimant shall coordinate installation of accepted substitution into the Project, making such changes as may be required for the Project to be complete in all respects.
 - 4) Claimant waives all claims for additional costs related to substitution which subsequently become apparent for integrating the substituted product, system or design into the Project.
 - 5) Claimant waives all claims for time extension(s) due to improper documentation requiring re-submission(s) of a Substitution Request Review.

B. Regulatory Requirements:

- 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. Products (and installation standards), systems or methods used for this Project shall comply with CARB standards in effect at the Project Site, and at the time of installation.

C. Acceptance of Substitutions:

- 1. Procedures:
 - a. The Contract is based on products, systems or designs described in the Contract Documents.
 - b. Architect will consider proposals submitted in accordance with time limits set within the Specification Section INSTRUCTIONS TO BIDDERS.
 - c. Architect is solely responsible for judging the acceptance of substitutions.

- 1) Acceptance of a substitution does not waive the product manufacturer's responsibility for product liability. The Architect will judge (based on the substitution submission data) for function and use product liability shall remain the responsibility of the product manufacturer.
- d. Substitute products, systems or designs shall not be used unless the substitutions have been specifically approved for this Project by the Architect.
 - 1) Substitute products, systems or designs that are related to structural, fire and life safety or access compliance shall not be used unless such substitution have been specifically approved for this Project by the Architect and the appropriate authority having jurisdiction.
- 2. Substitutions will not be considered if:
 - a. They are indicated or implied on product submittals in accordance with Specification Section SUBMITTAL PROCEDURES. Substitutions are not Submittals, and must be reviewed and approved prior to being submitted as a Submittal.
 - b. Acceptance will require substantial revision of Contract Documents.
 - c. They are submitted after the date set for substitutions within this Contract, unless:
 - 1) The specified or drawing item that has been verified to be discontinued or is otherwise unavailable.
 - 2) The Owner proposes a cost savings for the product, system or method.
 - 3) The Owner proposes early occupancy, and the proposed substitution allows for that convenience.

PART 2 - PRODUCTS NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULES

- A. Substitution Request Form:
 - 1. See the form attached to the end of this section.
 - 2. The attached form will be reproduced (and sequentially numbered by the Contractor after the award of the Contract) by the Claimant for any and all proposed substitutions.
 - 3. NO OTHER FORMS WILL BE ACCEPTED.

,	hment) TITUTION REQUEST FORM
ТО:	DARDEN ARCHITECTS, INC Check attached for minimum review \$400.00. 6790 N. West Avenue Fresno, CA 93711
CHEC	CK APPROPRIATE LINE:
	Substitution Request Prior to Bid (During Bid Period) Product or System Substitution Design Change Substitution
	Substitution Request After Award of the Contract Product or System Substitution Design Change Substitution

The Contractor Awarded the below.	e Contract for this	Project shall assign s	equential Substitution Request #	
Leave blank if submitted du	aring the Bid Period	1.		
SUBSTITUTION REQUES	ST #			
			OLLOWING PRODUCT OR WING ITEM FOR THIS PROJE	CT:
PROJECT:				
SPECIFIED ITEM:				
Specification Section # OR DRAWING ITEM:	· ·		Description	
Drawing #	Detail Cut #	Description	on	
PROPOSED CREDIT IF A	NY:			
PROPOSED SUBSTITUTI				
			s, photographs, performance and he data are clearly identified.	test

Attached data also includes a description of changes to the Contract Documents to which the proposed

substitution will require for its proper installation.

© Darden Architects, Inc. 012500 - 5 of 6 06/02/2022

The undersigned claimant certifies: (Modifications by the claimant to the following list is cause for automatic rejection without further review)

- 1. The proposed substitution does not affect dimensions shown on drawings or code requirements indicated.
- 2. The undersigned claimant shall compensate the Architect at a rate of \$212.00 an hour, two hour minimum for each review (check for \$424.00 must be attached to this form), for investigation and comments whether or not the request is approved for changes required to the building design, including engineering design, detailing, and construction costs caused by the requested substitution. The Architect is herein defined as any of those firms or individuals listed by reference on the Drawings, including all Consultants identified herein.
- 3. The proposed substitution will have no adverse affect on other trades, the construction schedule, or specified warranty requirements.
- 4. Maintenance and service parts will be locally available for the proposed substitution.
- 5. Attach information for a minimum of three projects where the substitution has been used locally within a 200 mile distance of this project, including names, addresses and telephone numbers of Owners who have accepted this product into their projects.
- 6. Attach all cost data with explanations if different from Specified or Drawing item. Include in that explanation a discussion on quality of proposed substitution and cost differential.
- 7. The undersigned claimant shall pay for any subsequent changes in incorporating the proposed substitution that were not apparent at the time of approval into the Work, including compensation to the Architect as described in item 2 above.

The undersigned Claimant(s) declares under penalty of perjury per the California Government Code Section 12650, et seq., that the claim of function, appearance and quality are equivalent or superior to the specified or drawing item, and further know and understand that submission for certification of a false claim may lead to fines, imprisonment and/or other severe legal consequences.

SUBMITTED BY CLAIMANT:	ADDITIONAL CLAIMANT SIGNATURE REQUIRED:
SignatureFirm	The Contractor or Construction Manager if submitted after the Award:
- · · · · · · · · · · · · · · · · · · ·	
Address	Signature
	Firm
Date	
Telephone	
DESIGN CONSULTANT USE C Check Not Attached - Not Acc Accepted Accepted as Noted Not Accepted Received Past Time Period Al	
Ву	Date
Remarks	

© Darden Architects, Inc. 012500 - 6 of 6 06/02/2022

END OF SECTION

SECTION 012973 – SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section includes the administrative and procedural requirements necessary to prepare and process the following:
 - 1. Schedule of Values

01 41 00

- a. Complete Schedule of Values.
- 2. Application for Payment with Certification.
- B. Related Requirements: The following Project Manual Sections contain requirements that relate to this section:

1.	01 11 13	SUMMARY OF WORK.
2.	01 21 13	ALLOWANCES.
3.	01 23 00	ALTERNATES.
4.	01 32 16	CONSTRUCTION SCHEDULE.
5.	01 32 36	FORMS AND REPORTS.
6.	01 33 00	SUBMITTAL PROCEDURES.

1.3 DEFINITIONS

7.

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring and controlling the construction project. Activities included in a Schedule of Values and Payment Request consume cost for time and resources.

REGULATORY REQUIREMENTS.

- B. Activity Code: Identifies each activity so as to be organized, group and sorted into Sub-Schedules, Areas of Work, and Reports.
- C. Allowances: Contract amounts allocated for specific activities of the project as identified in the contract documents.
- D. Application for Payments: A statement furnished by the Contractor allocating portions of the Contract Sum to various portions of the Work stipulating the amount of work that has been completed to date.
- E. Contingency: Contract amounts allocated for non-specific activities, to cover changes in the contract document work, unforeseen conditions and added scope of work to the project.
- F. Major Scope: Significant portions of work identified as, but not limited to, Base Bid, Alternate Bids, and Construction Phases, and Funding Criteria.

- G. Responsible Party: Entity that is responsible for performing the work of each activity as identified, but not limited to, General Contractor, and Sub-Contractor, second and tertiary tier Sub-Contractors, Manufacturers, Fabricators and Vendors.
- H. Schedule of Values: A statement furnished by the Contractor allocating portions of the Contract Sum to various portions of the Work.
- I. Scope Type: Segments of work identified as, but not limited to, Building ID, On-Site, and Off-Site.
- J. Sub-Schedules: Separated activities identified as part of the same element of work and arranged to show correlation with related elements.

1.4 SUBMITTALS

- A. General:
 - 1. Submit in accordance with Specification Section SUBMITTAL PROCEDURES.
- B. Format for Submittals: A tabular form type schedules.
 - 1. Provide a working electronic copy of schedule file.
 - a. Provide schedule files on Compact Disc (CD) or Digital Versatile Disc (DVD) (WINDOWS Formatted Disks) in a form that can be reviewed and used by the Owner, and Architect.
 - 2. Provide PDF electronic copy of schedule file.
 - 3. Provide Two (2) paper copies of schedules.
 - a. Sheet size shall be of adequate size to clearly show the required information for the entire construction period.
 - b. All required documentation shall have the Submittal number posted in the upper-right hand corner of the page.

C. Assurance/Control Submittals:

- 1. Schedule of Values.
 - a. Schedule of Bid Values.
 - 1) Submit within fourteen (14) days after the Award of Contract.
 - b. Complete Schedule of Values.
 - 1) Submit at the earliest possible date, but no later than fifteen (15) days prior to the date scheduled for submittal of initial Application for Payment.
- 2. Application for Payment and Certification.
 - a. Application for Payment and Certification Forms.
 - 1) Submit along with the Complete Schedule of Values submittal.
 - b. Initial Application for Payment.
 - 1) Submit seven (7) prior to due date.
 - c. Application for Payment for Progress of Work.
 - 1) Submit monthly by the date directed by Owner.
 - d. Application for Payment at Substantial Completion.
 - 1) Submit after Architect issues the Certificate of Substantial Completion.
 - e. Final Application for Payment.
 - 1) Submit after competing Project Closeout requirements.

1.5 SYSTEM DESCRIPTON

A. General:

- 1. The Architect considers the project Schedule of Values requirements to be significant to both the Contractor and the Owner. The development, submittal, and acceptance of the Schedule of Values, (Bid and Complete), and subsequent development and maintenance of the Application for Payments must be given high priority.
 - a. No payment will be made without the Architect's review and acceptance of the Schedule of Values.
 - b. Progress payments may be withheld in whole or part should the Contractor fail to comply with the requirements of this section.
 - c. No separate payment will be made to the Contractor for any of the requirements of this section. All such costs shall be part of the Contractor's planned project overhead costs included in its bid.

B. Performance Requirements:

- 1. Schedule of Bid Values: The Schedule of Bid Values shall be a breakdown of the Bid(s) submitted in the Bid Proposal and shall include all work that was bid on, regardless the scope of work awarded for construction. The breakdown shall be sufficient for the use by the Owner and Owner's Consultants to evaluate and determine cost of major scopes of work and the value of other owner agreements that are associated with the dollar value of the bid proposal.
 - a. Refer to Specification Section SUMMARY OF WORK.
 - o. Refer to Specification Section ALLOWANCES.
- 2. Complete Schedule of Values: Breakdown of the Contract Sum by specific line-item values, based on the individual activities in the Baseline Project Construction Schedules and to be the basis for the development of the Application for Payment.
 - a. Refer to Specification Section CONSTRUCTION SCHEDULES.
- 3. Application for Payments: Shall be derived from Baseline Project Construction Schedule utilizing the costs in the Complete Schedule of Values, and from subsequent Project Construction Schedule Updates, reflecting the Work performed as of planned and actual dates.
 - a. Refer to Specification Section CONSTRUCTION SCHEDULES.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. The Contractor must have the capacity and capability of supporting the project by producing schedule-related data within two (2) days of request by the Architect, or Owner.

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Coordination:

- Coordinate preparation of the Complete Schedule of Values with the preparation of the Baseline Project Construction Schedule. Refer to Specification Section – CONSTRUCTION SCHEDULES.
- 2. Correlate line items in the Complete Schedule of Values with other required administrative forms and schedules, including, but not limited to, the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittals Schedule.
 - c. Items required to be indicated as separate activities in the Baseline Project Construction Schedule.

B. Project Information:

- 1. Identification: Include the following Project Identification on all Schedule of Values and Application for Payment.
 - a. Project Name and Location.
 - b. Name of Owner and Address.
 - c. Name of Architect and Address.
 - d. Architect's Project Number.
 - e. Contractor's Name and Address.
 - f. Submittal Date.

2.2 COMPLETE SCHEDULE OF VALUES

A. Format:

- 1. Provide a comprehensive, fully developed, detailed Complete Schedule of Values in tabular form.
 - a. Provide and identify the following separate columns to indicate the following for each item listed:
 - 1) SPECIFICATION SECTION.
 - 2) ACTIVITY CODE.
 - 3) DESCRIPTION.
 - 4) RESPONSIBLE PARTY.
 - 5) MAJOR SCOPE.
 - 6) SCOPE TYPE.
 - 7) DOLLAR VALUE.
 - b. Provide and identify separate line-items to indicate the following;
 - 1) Activity.
 - 2) Sub-Schedules.
 - 3) Contract Conditions.
 - 4) Allowance(s).
 - 5) Purchase Contracts (if applicable).
 - 6) Contingency (ies).
 - 7) Grand Totals.

B. Content:

- 1. SPECIFICATION SECTIONS: Use the specification section number in the Project Manual Table of Contents to identify and establish each line-item
- 2. ACTIVITY CODE: Provide the Activity Identification Code for each line-item indicated as separate activities in the Baseline Project Construction Schedule.
- 3. DESCRIPTION: Provide a description of the work for each line-item associated with the specification section and responsible party.
- 4. RESPONSIBLE PARTIES: Identify the responsible party for performing the work of each line-item associated with the specification section and description.

- MAJOR SCOPE: Designate Major scope of work as identified and itemized in BID PROPOSAL.
 - a. Provide separate columns for each Major Scope of Work identified.
- 6. SCOPE TYPE: Identify each line-item that is associated with a segment of work.
- 7. DOLLAR VALUE: Sub-Total of the cost for each activity line-item, with the amounts rounded to the nearest dollar.
 - a. Assign a dollar value for each line-item to each Major Scope of the project excluding General Conditions, General Requirements and General Contractor^{TMTM}s Overhead and Profit.
- 8. Activity: As described in the Schedule of Bid Values and the following;
 - a. Expand to include entities, which is responsible for performing the work of each activity, identified as, but not limited to, General Contractor, and Sub-Contractor, second and tertiary tier Sub-Contractors, Manufacturers, Fabricators and Vendors.
 - b. Expand to include separate activity line-items for cost items that are directly related to Division 01 GENERAL REQUIREMENTS and are direct cost of actual work-in-place. Such items shall be, but not limited to, the following;
 - 1) Submittals,
 - 2) Field Engineering
 - 3) Operation and Maintenance Manuals.
 - 4) Demonstration and Training.
- 9. Sub-Schedules:
 - a. Major Scope of Work: Provide Sub-Schedules for line-items that are associated with each designated major scope of work as identified in Bid Proposal, and defined in Specification Section SUMMARY OF WORK and Specification Section ALTERNATES that requires itemization of each line-item value.
 - b. Scope Type: Provide Sub-Schedules for line-items that are associated with each specific scope type.
 - 1) Building Costs: Detailed cost breakdown of all cost items that are directly related to the Project per Building.
 - a) When the Project Building(s) is of sufficient size to warrant, break the building costs down into areas of work compatible with the Contractor's Means and Methods for construction sequences.
 - b) Building areas may consist of floor and roof levels and partial floor and roof levels.
 - 2) Project Site Costs: Detailed cost breakdown of all cost items that are directly related to the Project Site.
 - a) When the Project Site is of sufficient size to warrant, break the site costs down into areas of work compatible with the Contractor's Means and Methods for construction sequences.
- 10. Contract Conditions: As defined in the Schedule of Bid Values and the following;
 - Expand to include separate activity line-items for cost items that are directly related to Division 01 GENERAL REQUIREMENTS and are not direct cost of actual work-in-place. Such items shall be, but not limited to, the following;
 - 1) Temporary Facilities.
 - 2) Field Supervision.
 - 3) Project Identification Sign.
 - 4) Project Closeout Requirements.
 - a) Punch List Activities, and Project Record Documents.
 - b. Expand to include separate activity line-item for cost items that are directly related to Division 00 CONDITIONS OF THE CONTRACT REQUIREMENTS and are not direct cost of actual work-in-place. Such items shall be, but not limited to, the following;
 - 1) On-Site Facilities and Supervision.

- 2) General Contractor's Overhead and Profit.
- 3) Performance and Labor and Material Bonds.
- 11. Allowances: As defined in the Schedule of Bid Values.
- 12. Purchase Contracts: Provide separate line-item in the Schedule of Values for each Purchase Contract, showing the value of the Purchase Contract.
- 13. Contingencies: As defined in the Schedule of Bid Values.
- 14. Grand Total: As defined in the Schedule of Bid Values.

PART 3 - EXECUTION

3.1 APPLICATION AND CERTIFICATION FOR PAYMENT

A. General Requirements:

- 1. Coordination: Coordinate the preparation of the Application for Payment with the preparation of the Complete Schedule of Values and Project Construction Schedule.
 - a. Entries shall match data on the Complete Schedule of Values and Project Construction Schedule and Project Schedule Updates, if revisions were made.
- 2. Application and Certification for Payment Forms: Use forms accepted by the Architect and Owner for Applications for Payment.
 - a. Form shall be based on AIA Document G702 Application and Certification for Payment and AIA Document G703 Continuation Sheets.
 - b. Submit form for acceptance with initial submittal of Complete Schedule of Values.
- 3. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of the Contractor. Project Inspector or Architect will return incomplete applications without action.
 - a. Use signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include Waivers of Lien and similar attachments if required.
- 4. Identification: Include the following Project Identification on all Application for Payment:
 - a. Project Name and Location.
 - b. Owner Name.
 - c. Architect's Project Number.
 - d. Contractor Name and Address.
 - e. Application Number.
 - f. Application Date.
 - g. Period To:

B. Format.

- 1. Provide a comprehensive, fully developed, detailed Application for Payment with Continuation Sheets in tabular form.
 - a. Provide and identify the following separate columns to indicate the following for each item listed;
 - 1) ACTIVITY CODE.
 - 2) DESCRIPTION.
 - 3) SCHEDULED DOLLAR VALUE.
 - 4) WORK COMPLETED.
 - a) FROM PREVIOUS APPLICATION.
 - b) THIS PERIOD.
 - 5) TOTAL COMPLETED.
 - 6) PERCENTAGE OF COMPLETION.
 - BALANCE TO FINISH.

- 8) RETAINAGE.
- b. Provide and identify separate line-items to indicate the following the following;
 - 1) Activity.
 - 2) Sub-Schedules.
 - 3) Contract Conditions.
 - 4) Allowance(s).
 - 5) Purchase Contracts (if applicable).
 - 6) Contingency (ies).
 - 7) Grand Totals.
 - 8) Change Orders.

C. Content:

- 1. ACTIVITY CODE: Provide the Activity Identification Code for each line-item of Work as indicated as separate activities in the Project Construction Schedule
- 2. DESCRIPTION OF WORK: Provide the same description as indicated in the Schedule of Values for each line item.
- 3. SCHEDULED DOLLAR VALUE: Provide the same amount as indicated in the Schedule of Values for each line item.
- 4. WORK COMPLETED: with the following sub-columns.
 - a. FROM PREVIOUS APPLICATION, include Dollar Value for work completed in previous Application for Payment, whether or not payment has been received.
 - b. THIS PERIOD, include only the Dollar Value for work completed at the time of Application for Payment.
- 5. TOTAL COMPLETED: The sum Dollar Value of Work Completed and Materials Presently Stored.
- 6. PERCENTAGE OF COMPLETION: The percentage value of the total Work Completed and the Stored to Date divided by the Scheduled Value.
- 7. BALANCE TO FINISH: The dollar value of the Scheduled Value minus the Total Completed.
- 8. RETAINAGE: The dollar value of the percentage of retention per contract agreement.
- 9. Activity:
 - a. Use the Complete Schedule of Values and Baseline Project Schedule as a guide to establish activity line-items for the Application for Payment.
 - b. Include separate activity line-items when a work activity is separated into stages and requires separate payments for each stage.
 - c. Provide separate line-items for each part of the Work where separate payments will be requested including, but not limited to, submittals, materials, equipment, fabrication and installation.
 - d. Provide separate line items for materials stored but not yet installed, where separate payments will be requested.
- 10. Sub-Schedules: As described in the Complete Schedule of Values.
- 11. Contract Conditions: As described in the Complete Schedule of Values.
- 12. Allowances: As described in the Complete Schedule of Values.
- 13. Purchase Contracts: As described in the Complete Schedule of Values
 - a. Indicate Owner payments or deposits, if any, and balance to be paid by the Contractor
- 14. Contingencies: As described in the Complete Schedule of Values.
- 15. Grand Totals: As described in the Complete Schedule of Values.
- 16. Change Orders:
 - a. Include amounts of approved Change Orders or Construction Change Directives issued before the last day of construction period covered by application.
- D. Supplemental Information:

- 1. Materials Stored: Include in Application for Payment the amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site.
 - b. Provide certificate of insurance or Bonded Warehousing, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
 - c. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 - d. Provide summary documentation for stored materials indicating the following:
 - 1) Materials previously stored and included in previous Applications for Payment.
 - 2) Work completed for this Application utilizing previously stored materials.
 - 3) Additional materials stored with this Application.
 - 4) Total materials remaining stored, including materials with this Application.
- 2. Waivers of Mechanic's Lien: With each Application for Payment, submit Waivers of Mechanic's Liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
 - a. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 - b. When an Application shows completion of an item, submit conditional final or full waivers.
 - c. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - d. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 - e. Waiver Forms: Submit waivers of lien on forms executed in a manner acceptable to Owner.
- E. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for payment include the following:
 - 1. List of Subcontractors.
 - 2. Schedule of Values.
 - 3. Contractor's Construction Schedule (preliminary if not final).
 - 4. Products List (preliminary if not final).
 - 5. Schedule of Unit Prices.
 - 6. Submittal Schedule (preliminary if not final).
 - 7. List of Contractor's Staff Assignments.
 - 8. List of Contractor's Principal Consultants.
 - 9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 - 10. Initial Progress Report.
 - 11. Report of Preconstruction Conference.
- F. Application for Payment for Progress of Work:
 - 1. Each Application for Payment shall be consistent with previous applications and payments as certified by the Project Inspector, Architect, and paid for by the Owner.
 - 2. Payment Applications shall be submitted to the Architect by the date established by the Owner. The maximum period of time covered by each Application for Payment is for one month.
 - 3. Payments Applications shall be updated to reflect any revised activity in the Project Schedule Updates.

- G. Application for Payment at Substantial Completion: After the issuing of the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portions of the Work claimed as substantially complete.
 - 1. Include documentation supporting the claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 - 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- H. Final Application for Payment: Submit Final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
 - 1. Evidence of completion of Project closeout requirements.
 - 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 - 3. Updated final statement accounting for final changes to the Contract Sum.
 - 4. "Contractor's Affidavit of Payment of Debts and Claims".
 - 5. "Contractor's Affidavit of Release of Liens".
 - 6. "Consent of Surety to Final Payment".
 - 7. Evidence that claims have been settled.
 - 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 - 9. Final liquidated damages settlement statement.

END OF SECTION

CONTRACTORS PROJECT MANAGEMENT AND COORDINATION

SECTION 013113 - CONTRACTOR'S "PROJECT MANAGEMENT" AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely manage and coordinate the Project as necessary to construct and complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 DESCRIPTION:

- A. Manage and Coordinate scheduling, submittals, and work of the various sections of the Project Manual to assure efficient and orderly sequence of installation of construction elements with provisions for accommodating items to be installed later.
 - 1. Coordinate sequence of Work to accommodate Owner Occupancy as specified in the Conditions of the Contract in Division 00 and the General Requirements in Division 01.
 - 2. The Contractor shall set up control procedures so that "approved schedules" are adhered to. Contractor's responsibility is to correctly notify Owner's Representative of anticipated and actual time delays.
 - 3. Contractor's job superintendent shall be on site at all times that the Work is in progress. Superintendent shall not perform other functions such as trade work or parts pick-up.
 - 4. Interruption of Services:
 - a. Adequate advance written notice (a minimum of fourteen (14) days) shall be given to the Owner's Representative when interruptions of utility services, or interference with the use of existing building and roads are anticipated.
 - b. Any interruption of utility services shall be made by the Contractor with the Owner's Representative in attendance. Contractor shall not interrupt any utility services without the Owner's Representative present.
 - 5. Planned utility service shutdowns shall be accomplished during periods of minimum usage.
 - a. In some cases, this may require work outside of normal (7:00 am to 5:00 pm) work hours, at no additional cost to the Owner.
 - b. The Contractor shall program its work so that service will be restored in the minimum possible time, and shall cooperate with the Owner's Representative in reducing shutdowns of utility system.
 - c. Adequate advance written notice (a minimum of fourteen (14) days) shall be given to the Owner's representative before interruptions to utility services and other interference to the use of, or access to existing buildings and facilities.

CONTRACTORS PROJECT MANAGEMENT AND COORDINATION

- d. Required access ways shall be kept open at all times; the use of one way traffic and detours shall be held to a minimum.
- 6. Coordinate the Work and do not delegate the responsibility for coordination to any sub-contractor.
- 7. Anticipate the interrelationship of all sub-contractors, and their relationships to one another.
- 8. Resolve differences or disputes between sub-contractors concerning coordination, interference, or extent of Work.

1.3 SUBMITTALS

- A. Schedule and coordinate submittals specified in Specification Section SUBMITTAL PROCEDURES, and in Specification Section PROJECT CLOSEOUT.
 - 1. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
 - 2. Coordinate requests for substitutions to assure compatibility of space, of operating elements, and effect on work of other sections.

1.4 QUALITY ASSURANCE

A. Coordination of Space:

- 1. Coordinate use of Project space and sequence of installation of mechanical work, and electrical work, which is indicated diagrammatically on the Drawings. Follow routings shown for pipes, ducts, and conduits as closely as practicable, with due allowance for available physical space.
 - a. Utilize space efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- 2. In finished areas, except as otherwise shown, conceal pipes, ducts, and wiring in the construction.
 - a. Coordinate locations of fixtures and outlets with finished elements.
- 3. Site Utility Coordination:
 - a. Provide 1"=20' scaled and dimensioned Utility Coordination Drawing showing all existing and proposed underground and surface utility improvements including gas, domestic water, fire water, chilled water, hot water, irrigation, storm sewer, sanitary sewer, electrical power, and communications. No site improvements shall be installed prior to Architect's and Owner's review of coordination drawing. Architect's and Owner's review is only for general conformance with the Contract Documents.

B. Coordination of Project Closeout:

- 1. Coordinate completion and cleanup of work of separate sections in preparation for Owner occupancy.
- 2. After Owner occupancy of premises, coordinate access to site by various sections for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
- 3. Assemble and coordinate closeout submittals specified in Specification Section PROJECT CLOSEOUT.

C. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

06/02/2022

CONTRACTORS PROJECT MANAGEMENT AND COORDINATION

D. Meetings:

1. Hold coordination meetings and pre-installation meetings with requisite personnel to assure coordination of Work.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

END OF SECTION

SECTION 013216 - CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - a. Project Construction Schedules.
 - b. Coordination Schedules.
 - c. Schedule Modifications.
 - d. Time Extensions.

B. Related Requirements:

- 1. 01 11 13 SUMMARY OF WORK.
- 2. 01 29 73 SCHEDULE OF VALUES.
- 3. 01 33 00 SUBMITTAL PROCEDURES.
- 4. 01 41 00 REGULATORY REQUIREMENTS.
- 5. 01 45 23 TESTING AND INSPECTION SERVICES.

1.3 DEFINITIONS

- A. The following definitions or terms apply to this specification section:
 - Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - a. Critical Activity is an activity on the critical path that must start and finish on the planned early start and finish times.
 - b. Predecessor Activity is an activity that precedes another scheduled activity.
 - c. Successor Activity: An activity that follows another scheduled activity.
 - 2. Activity Code: Identifies each activity so as to be organized, group and sorted into Sub-Schedules, Areas of Work, and Reports.
 - 3. Construction Schedule: A logical analysis listing the project's milestones, activities, and deliverables with planned dates for performing the scheduled activities and milestones.
 - 4. Critical Path: The longest continuous chain of activities through the schedule that establishes the minimum overall project duration.
 - 5. Event: The starting or ending point of an activity.
 - 6. Float: The measure of leeway in starting and completing an activity.
 - a. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is jointly owned, expiring Project resource is available to both parties as needed to meet the schedule milestones and contract completion date.
 - b. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - c. Total float is the measure of leeway in starting of or completing an activity without adversely affecting the planned Project completion date.

- 7. Milestone: A key or critical point in time for reference or measurement.
- 8. Inclement Weather: Temperature, Precipitation, Fog, and Muddy conditions that may impede the progress of the Project construction on critical activities for more than fifty percent (50%) of the Contractor's scheduled work day.
- 9. Responsibility Code: Identify entities that are responsible for performing the work of each activity as identified, but not limited to, General Contractor, Sub-Contractor, second and tertiary tier Sub-Contractors, Manufacturers, Fabricators and Vendors.
- 10. Unusually Severe Weather: The amount of excessive Inclement Weather that is greater than the anticipated number of Inclement Weather days for any given month.
- 11. Mud Days: The amount of excessive muddy site conditions which prohibit access to and around the Project site, access to buildings and impedes the progress of the Project construction on critical activities as a result of Unusually Severe Weather.
- 12. NOAA: National Oceanic and Atmospheric Administration.

1.4 SUBMITTALS

- A. General:
- B. Submit in accordance with Specification Section SUBMITTAL PROCEDURES.
- C. Format for Submittals: A time-scaled bar chart and Gantt-chart-type schedules.
 - 1. Provide a working electronic copy of schedule file.
 - 2. Provide schedule files on Compact Disc (CD) or Digital Versatile Disc (DVD) (WINDOWS Formatted Disks) in a form that can reviewed and used by the Owner, and Architect.
 - 3. Provide PDF electronic copy of schedule file.
 - 4. Provide (Two) < Insert Number> paper copies of schedules.
 - 5. Sheet size shall of adequate size to clearly show the required information for the entire construction period.
 - 6. All required documentation shall have the Submittal number posted in the upper-right hand corner of the page.

D. Assurance/Control Submittals:

- 1. Project Construction Schedules:
 - a. Initial Project Schedule (IPS);
 - 1) Submit within fourteen (14) days after the Award of Contract.
 - b. Baseline Project Schedule (BPS);
 - 1) Submit within twenty-one (21) days after the Notice to Proceed date.
 - 2) Sub-Schedules;
 - 3) Submit as requested by Architect or Owner.
- 2. Coordination Schedules:
 - a. Short Interval Schedules (SIS);
 - 1) Submit at the regularly scheduled meetings.
 - b. Monthly Schedule Updates (MSU);
 - 1) Submit seven (7) days prior to the designated regularly scheduled monthly Progress Meeting for Schedule Review.
 - 2) Submit the agreed upon MSU one week prior to monthly progress payments.
- 3. Schedule Modifications:
 - a. Change in Sequence;
 - 1) Submit as needed at a regularly scheduled Progress Meeting.
 - b. Recovery Schedule;
 - 1) Submit as needed at a regularly scheduled Progress Meeting.

- c. Alterations to Schedule;
 - 1) Submit as needed at a regularly scheduled Progress Meeting
- 4. Time Extension Requests:
 - a. Notice of Delay;
 - 1) Submit within seven (7) days after a delay event, and/or with a Change Order Request (COR) that is in response to a CCD, RFP, or other documents issued by the Architect.
 - b. Inclement Weather;
 - 1) Submit within twenty-four (24) hours after an event.

1.5 SYSTEM DESCRIPTION

A. General:

- 1. The Architect considers the project schedule requirements to be of significant importance to both the Contractor and the Owner. The development, submittal, acceptance and maintenance of the Initial Project Schedule, Baseline Project Schedule and subsequent Monthly Schedule Updates must be given high priority.
 - a. Progress payments may be withheld in whole or part should the Contractor fail to comply with the requirements of this section.
 - b. No separate payment will be made to the Contractor for any of the requirements of this section. All such costs shall be part of the Contractor's planned project overhead costs included in its bid.

B. Performance Requirements:

- 1. The Baseline Project Schedule shall be the basis for evaluating the job progress and time extension requests. The responsibility for developing the Baseline Project Schedule, accurately updating the schedule, and monitoring the actual progress of the work compared to the planned schedule rests solely with the Contractor.
 - a. Failure of the Contractor to include any element of the work or any inaccuracy in the Baseline Project Schedule will not relieve Contractor from the responsibility for accomplishing all the work in accordance with the Contract requirements.
- 2. Inclement Weather: The Contractor shall have included all impacts to weather dependent activities, resulting from the anticipated Inclement Weather in the Baseline Project Schedule.
 - a. Contractor shall be responsible for all associated time delays and costs.
 - b. Contractor shall be responsible to account for associated mitigating measures which includes, but not limited to, dewatering, mucking, temporary weather protection, gravel roadways, equipment downtime, etc.
 - c. Contractor shall be responsible to account for the site's soil conditions, drainage patterns, and other elements that may be affected.
- 3. Cost Correlation: The Initial Project Schedule and the Baseline Project Schedule shall be the basis for developing the Schedule of Values and the Work performed as of planned and actual dates used for preparation of The Application for Payment Requests.
 - a. Refer to Specification Section SCHEDULE OF VALUES.
- 4. Early Completion Schedules: Early completion schedules may be prohibited due to certain physical or monetary constraints imposed upon the Owner.
 - a. If not prohibited, and is contemplated by the Contractor as part of its bidding strategy, it is hereby expressly understood by the Contractor that early completion schedules will only be acceptable under the condition that the schedule be reasonable and realistic.
 - b. The Contractor certifies that it has included general conditions costs in its bid sufficient for the entire contractual time of performance.

c. No damages for delay will be recoverable if the project is prolonged beyond the early completion date, but still completed within the entire contract duration.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. The Contractor must have the capacity and capability of supporting the project by producing schedule-related data within two (2) days of request by the Contractor, Architect, or Owner.

B. Regulatory Requirements:

1. In accordance with Specification Section - REGULATORY REQUIREMENTS.

C. Meetings:

- Prescheduling Conference: Scheduled by the Contractor prior to submitting the Baseline Project Schedule, unless otherwise agreed to by the Architect and Owner, for the proper coordination of the work. Conduct conference at Project site. Review methods and procedures related to the Baseline Project Schedule, including, but not limited to, the following:
 - a. Discuss constraints, including phasing, work stages, area separations, interim milestones and partial Owner occupancy.
 - b. Review delivery dates for Owner-Furnished products.
 - c. Review schedule for work of Owner's separate contracts.
 - d. Review submittal requirements and procedures.
 - e. Review time required for review of submittals and resubmittals.
 - f. Review requirements for test and inspections by independent testing and inspection agencies.
 - g. Review time required for Project closeout and Owner startup procedures.
 - h. Review and finalize list of construction activities to be included in schedule.
 - i. Review procedures for updating schedule.
- 2. Progress Meetings: Scheduled by the Contractor for the proper coordination of the work.
 - a. Weekly Progress Meeting: Schedule on a weekly basis, unless otherwise agreed to by the Architect and Owner;
 - 1) Review Short Interval Schedule.
 - 2) Discuss field observations, problems, and decisions.
 - b. Monthly Schedule Update: Designate a regular monthly meeting to address and resolve all schedule issues for the prior month;
 - 1) Identification of any potential problems which may impede planned progress.
 - 2) Corrective measures to regain projected schedules.
- 3. Participants (or designated representative) invited to attend each of the above meetings shall be as follows:
 - a. Contractor.
 - b. Owner.
 - c. Architect.
 - d. Project Inspector.
 - e. Installer(s), as appropriate.
 - f. Material Manufacturer(s), as appropriate.
 - g. Subcontractors, as appropriate (including any accessory subcontractors).

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Time Frame: Extend schedules from dates established from the Notice to Proceed to final completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date.
- B. Activity Data: Schedule to show early start, early finish, late start, late finish, original duration, remaining duration, total float and percentage completion.
 - 1. Contractor shall submit a detailed BPS presenting an orderly and realistic plan for the completion of the entire project.
 - a. The BPS shall not show more than 10% of the total activities as critical.
 - b. The BPS shall not show more than 20% of the activities with total float of 10 working days or less.
 - c. The schedule shall not show any activities with negative float.
 - d. Start and Finish constraints, unless identified in the contract documents, shall be minimized as much as possible.
 - 2. Schedule activities that are dependent on submittal approval and/or material delivery. Activities shall not be scheduled to start earlier than the reasonably expected review, and acceptance or delivery dates.
 - a. Coordinate Submittal Schedule with the list of subcontractors, and the list of products.
 - b. Prepare the schedule in chronological order. Provide information as called for in Specification Section SUBMITTAL PROCEDURES.
 - c. Submittal Review Time: Include review and resubmittal times indicated in Specification Section SUBMITTAL PROCEEDURES in schedule.
- C. Activity Duration: Activity durations shall be the total number of days required to perform that activity.
 - 1. Define activities so no activity is longer that twenty (20) days, unless specifically allowed by Architect, except for submittal, approval, fabrication and delivery (procurement) activities
 - 2. Activities that require three months or longer to complete, indicate an estimated completion percentage in ten (10) percent increments within the time bar.
 - 3. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than sixty (60) days, as separate activities in schedule.
 - a. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery
 - 4. Startup and Testing Time: Include no fewer that fifteen (15) days for startup and testing.
 - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 - 6. Punch List and Final Completion: Include not more than thirty (30) days for completion of punch list items and final completion.

D. Constraints:

Constraints: Include constraints and work restriction indicated in the Contract
Documents and as follows in schedule, and show how the sequence of the Work is
affected.

- a. Phasing: Arrange list of activities on schedule by phase as indicated in Specification Section SUMMARY OF WORK
- b. Include a Separate activity for each of the following:
 - 1) Work under More Than One Contract.
 - 2) Work Performed By Owner.
 - 3) Each Product Ordered In Advance, include delivery dates.
 - 4) Each Owner-Furnished Product, include the delivery dates.
- c. Work Restrictions: Show the effect of the following items on the schedule:
 - 1) Coordination with existing construction.
 - 2) Limitations of continued occupancies.
 - 3) Uninterruptible service.
 - 4) Partial occupancy before Substantial Completion.
 - 5) Use of premises restrictions.
 - 6) Provisions for future construction.
 - 7) Seasonal variations.
 - 8) Environmental control.
- d. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - 1) Submittals.
 - 2) Purchases.
 - 3) Mockups
 - 4) Fabrication
 - 5) Sample Testing.
 - 6) Deliveries
 - 7) Installation
 - 8) Test and inspections
- e. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities.
- E. Inclement Weather: The schedules shall include delays due to the effect of the anticipated Inclement Weather, including resultant muddy conditions, in all-weather dependent activities.
 - 1. The Contractor shall submit with the Baseline Project Schedule, a National Oceanic and Atmospheric Administration (NOAA) Meteorological Data Chart showing the "Normals", "Means" and "Extremes" of monthly Temperature, Precipitation, and Fog for the area where the project is located.
 - a. The Owner reserves the right to update Meteorological Data, so that it reflects the most accurate data for the project site, site conditions and locality.
 - 2. Upon review and acceptance, the Meteorological Data Chart shall be the baseline for evaluating anticipated weather related delays. Refer to the "sample" Meteorological Data Chart provided herein.
 - a. Provide the number of delay days of anticipated Inclement Weather in the schedule per month.
 - b. Provide the number of delay days of anticipated Mud Days in the schedule per month.
 - 1) Not all Mud Days are eligible for delays, only a portion of the actual Mud Days will be considered.
 - 2) Mud Days shall be based on a percentage of actual precipitation days.

 Upon review and found acceptable, the percentage shall be applied to actual precipitation that are above and beyond the anticipated Inclement Weather.
 - 3) It is the Contractors obligation to become aware of the site soil conditions, drainage patterns, and other elements that may affect the resulting impacts due to Mud Provide.

F. Project Information:

- Identification: Include the following Project Identification on all Project Construction Schedules, Coordination Schedules, Schedule Modifications and Time Extension Requests.
 - a. Project Name and Location.
 - b. Name of Owner and Address.
 - c. Name of Architect and Address.
 - d. Architect's Project Number.
 - e. Contractor's Name and Address.
 - f. Submittal Date.

2.2 INITIAL PROJECT SCHEDULE (IPS)

A. Format:

- 1. Prepare in form of a summary level horizontal-box-column Bar-Chart Schedule:
 - a. Provide and identify separate columns to indicate the following;
 - 1) SPECIFICATION SECTION.
 - 2) DESCRIPTION.
 - 3) RESPONSIBILITY CODE.
 - 4) HORIZONTAL TIME SCALE.
 - b. Provide and identify separate activity line-item horizontal bars to indicate the following;
 - 1) Activity.
 - 2) Milestones.
 - 3) Contract Conditions.

B. Content:

- 1. SPECIFICATION SECTION: Use the specification section number in the Project Manual Table of Contents to identify and establish each line-item.
- 2. DESCRIPTION: Provide a description of the work for each line-item associated with the specification section and responsible party.
- 3. RESPONSIBILITY CODE: Provide responsibility code that identifies the responsible party for performing the work of each activity line-item associated with the specification section and description.
- 4. HORIZONTAL TIME SCALE: Identify the week, month and year. Indicate the first work day of each week with a continuous vertical line.
 - a. Extend from the date established from the Notice to Proceed to the date of Final Completion.
- 5. Activity: Provide a summary level bar chart with distinct graphic delineation for each activity line-item.
 - a. Provide at least one activity line-item for the work in each Specification Section.
 - 1) Provide separate activity line items for each Contractor or Subcontractor providing work under the same specification section.
 - b. Organize activities in chronological order by the beginning of each Activity.
- 6. Milestones: Include initial milestones with dates for the Notice to Proceed, Project Start, Substantial Completion, and Final Completion.
- 7. Contract Conditions:
 - a. Identify and provide separate activity line-items that are directly related to Division 01 GENERAL REQUIREMENTS.
 - b. Identify and provide separate activity line-items that are directly related to Division 00 CONDITIONS OF THE CONTRACT.

2.3 BASELINE PROJECT SCHEDULE (BPS)

A. Format:

- 1. Provide a comprehensive, fully developed, detailed, and complete horizontal Gantt-Chart type schedule based on the Initial Project Schedule.
 - a. Provide and identify separate columns to indicate the following:
 - 1) ACTIVITY CODE.
 - 2) SPECIFICATION SECTION.
 - 3) DESCRIPTION.
 - 4) RESPONSIBLE CODE.
 - 5) HORIZONTAL TIME SCALE.
 - b. Provide and identify separate line-item horizontal bars to indicate the following:
 - 1) Activity
 - 2) Sub-Schedules
 - 3) Milestones
 - 4) Contract Conditions

B. Content:

- 1. ACTIVITY CODE: Assign Activity Codes that identifies each separate activity line-item to allow the following, but not limited to, to be appropriately sort and grouped into Sub-Schedules, Major Areas of Work, and Reports:
 - a. "construction area," "trade" or "submittal/procurement".
- 2. SPECIFICATION SECTIONS: As described in the Initial Project Schedule.
- 3. RESPONSIBLE CODE: As described in the Initial Project Schedule.
- 4. HORIZONTAL TIME SCALE: As described in the Initial Project Schedule.
- 5. Activity: As describe in the Initial Project Schedule and expand to provide a detailed level bar chart with distinct graphic delineation for each activity line-item.
 - a. expand to include entities, which are responsible for performing the work of each activity, identified as, but not limited to General Contractor, and Sub-Contractor, second and tertiary tier Sub-Contractors, manufactures, fabricators and vendors.
 - b. Include activities for planned mobilization and sequence of early operations
- 6. Sub-Schedules: Sub-Schedules shall include, but not be limited to, the following:
 - a. Major Scope of Work: Identify each major area of construction for each major portion of the Work.
 - 1) Include, but not limited to, the following: Phasing, Alternates, Construction Phases and funding Criteria.
 - b. Scope Type: Identify each major area of construction for each major portion of the Work, such as:
 - 1) Site Utilities
 - 2) Site Development Zones
 - 3) Buildings.
 - a) If necessary, separate each floor or separate areas of each main elements of the work.
 - c. Submittals: Include a separate sub-schedule for all submittal, approval and procurement activities, including owner-furnished items.
 - 1) Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - d. Testing and Inspection: Include a separate sub-schedule for all required on-site testing, off-site testing, mock-ups, and inspections.
- 7. Milestones: As describe in the Initial Project Schedule and include other milestones indicated in the Contract Documents and the following interim milestones.
 - a. Earthwork.

- b. Building Foundations and slab on grade.
- c. Structural completions.
- d. Partial Occupancy before Substantial Completion.
- e. Temporary Enclosure and Space Conditioning.
- f. Permanent Space enclosure.
- g. Completion of Mechanical.
- h. Completion of Electrical Installation.
- i. Completion of Communication Installation.
- j. Substantial Completion
- k. Finial Completion
- 8. Contract Conditions: As described in the Initial Project Schedule and expanded to include separate activity line-items that are directly related to Division 01 General Requirements and are not of actual work-in-place. Such items shall be, but not limited to the following.
 - a. Temporary Facilities.
 - b. Field Engineering.
 - c. Project Closeout Requirements:
 - 1) Startup and Testing Time:
 - 2) Operation and Maintenance.
 - 3) Demonstration and Training.
 - 4) Punch List.

PART 3 - EXECUTION

3.1 SCHEDULES AND PROCEDURES FOR CONSTRUCTION SCHEDULES

A. General Requirements:

- 1. The Architect may request the Contractor to provide (at no cost) the following additional reports or schedule plots:
 - a. Total or Free Float Report from least to most float.
 - b. Subcontractor Certifications, indicating approval of the subcontractors scheduled work, acknowledging outside factors such as manpower resources, stacking of trades, multiple mobilizations, and coordination of space with other trades and the stacking of trades.
 - c. Narrative Reports: May include but not limited to the following descriptions;
 - 1) Last month's progress achieved, and anticipated next month's progress.
 - 2) Problems or delays experienced and an explanation of mitigating actions taken.
 - 3) Current or anticipated delays and proposed mitigation action to be taken.
 - 4) Listing of all submittals, RFIs, Change Directives, Owner-supplied equipment or other Owner-controlled and critical constraints affecting the Contractor's progress.

B. Coordination Schedules:

- 1. Short Interval Schedules (SIS): A look-ahead schedule.
 - a. Provide a three-week snapshot of the work generated from the most recent monthly Schedule Update.
 - b. Include the current week, and two week thereafter.
 - c. The schedule shall contain sufficient detail to evaluate inspection requirements, and for the Contractor to anticipate manpower and equipment needs.
- 2. Monthly Schedule Updates (MSU): Accurately indicate the actual progress of the work during the prior month.

- a. Indicate the date through which progress is reported shall be identified on all update schedule.
 - 1) Provide the actual start and finish dates of activities commenced or completed during the prior month.
 - Once the actual start and finish dates are updated and accepted as accurate, this data shall not be changed. This portion shall be considered an "As-Built".
 - 3) If the schedule data is changed due to a routine updating only, no identification or discussion of such changes is required.
- b. The Monthly Schedule Updates shall include the Schedule Modifications and Time Extensions that have been mutual agreed to by the Architect and Contractor.
 - 1) In the event of multiple Schedule Modifications and Time Extensions, events shall be updated into the current Monthly Schedule Update in the actual order of occurrence.
- c. The Architect's review comments shall be incorporated into the next update for the Architect's verification.

C. Schedule Modifications:

- 1. Changes in Sequence:
 - a. If the Architect determines that the sequence of the construction differs significantly from the Contract schedule, the Contractor shall submit a revised schedule for approval within fourteen (14) days of the Architect's request.
 - b. If the work is re-sequenced, or if activities are added or deleted, these schedule data changes must be specifically identified, discussed and submitted.
 - 1) The submittal shall be separate and apart from the routine monthly update submittals.
 - c. If the changes are reviewed and found acceptable, the schedule revision shall be made and incorporated into the project schedule prior to the next Monthly Schedule Update submittal.
 - 1) The Contractor agrees to be bound by the revised, re-sequenced or optimized schedules, and agrees to make no claim for such.

2. Recovery Schedule:

- a. When periodic update indicates, the Work is fourteen (14) or more calendar days behind the current approved schedule, submit a separate recovery schedule indication means by which Contractor intends to regain compliance with the schedule.
- b. Submittal shall indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
 - 1) The submittal shall be separate and apart from routine monthly update submittals.
- c. The Contractor agrees to be bound by the revised, re-sequenced or optimized schedules, and agrees to make no claim for such.

3. Alterations to Schedule:

- a. If the Contractor intends to alter its planned sequence or approach to the work, the Contractor shall submit a request of the schedule revisions or sequence changes to the Architect for review and comment.
- b. Submittal shall include a description of the reason(s) for the schedule changes, a description of the changes being made, a list of all added and deleted activities, changed logic relationships, changed activity durations or descriptions, etc.
 - 1) The submittal shall be separate and apart from routine monthly update submittals.

- c. If the requested changes are reviewed and found acceptable, the schedule revision shall be made and incorporated into the project schedule prior to the next Monthly Schedule Update submittal.
 - 1) The Contractor agrees to be bound by the revised, re-sequenced or optimized schedules, and agrees to make no claim for such.

D. Time Extension Submittals:

- 1. Notice of Delay:
 - a. Provide "Notice of Delay" submittal to the Architect for all claimed time extension requests, showing the impact of the delay event on the Project Schedule. Refer to the "sample" "Notice of Delay" form provided herein.
 - 1) Submit as a Change Order Request (COR) in response to an event, SI, RFI, RFP, or other documents issued by the Architect.
 - 2) In cases where the Contractor does not provide "Notice of Delay" submittal for a delay event within the specified time limits, then it is mutually agreed that the delay event has no time impact on the contract completion date (or interim milestones) and no time extension is required
 - b. The Submittal shall demonstrate the time impact based on the date(s) and durations of the delay event, the status of construction at that point in time, and the affect on the scheduled sequence, progress of the Critical Path Activities and Project Completion.
 - 1) The Submittal shall be based on the latest Monthly Schedule Update.
 - 2) The Submittal shall include all supporting project documentation or delay calculations that establish entitlement and quantify the delay.
 - 3) The Submittal shall demonstrate the activity or activities effects on the total float along the activity path at the time the event occurred.
 - 4) The Contractor must propose possible mitigation plans (sequence changes and any costs) for otherwise critical path delays.
 - a) The Contractor shall provide an evaluation of the cost of mitigation versus the cost of extended project performance.
 - c. If the requested changes are reviewed and found acceptable, the schedule revision shall be made and incorporated into the project schedule prior to the next Monthly Schedule Update submittal.
 - 1) Extensions of time for performance will be granted only to the extent that the equitable time adjustment for the activity or activities affected exceeds the total float.
 - 2) The Contractor acknowledges and agrees that mitigation of delays due to delay events may require a change to preferential sequences of work.
 - a) The Contractor agrees to be bound by the revised, re-sequenced or optimized schedules, and agrees to make no claim for such.
 - d. The Owner (or District) shall not be liable for any acceleration costs due to the Contractor's failure to comply with the contract requirements for requesting, documenting and demonstrating that a time extension is required for a delay event.
 - The Contractor's obligation to timely perform per the schedule will not be excused until time extension requests are reviewed and accepted by the Architect.

2. Inclement Weather Delays:

- a. General:
 - 1) The Contractor shall record on the Contractor Daily Reports, each occurrence of Inclement Weather and Mud impacts to the progress of scheduled work through the Contract duration.
 - a) Inclement Weather days will be counted chronologically from the first to the last day of each month, with each daily incidence of "Inclement Weather" being counted as a whole day.

- b) Each occurrence of Inclement Weather and Mud, must be verified and approved by the Inspector of Record.
- b. Unusually Severe Weather:
 - Provide "Unusually Severe Weather• submittal to the Architect for all claimed time extension requests, showing the impact of the delay event on the contract schedule. Refer to the "sample" "Notice of Unusually Severe Weather" form provided herein.
 - 2) Submit as a Change Order Request (COR).
 - 3) The submittal shall demonstrate the time impact based on the date(s) and durations of the delay event, the status of construction at that point in time, and the effect on the scheduled sequence and progress of the Critical Path Activities.
 - a) The submittal shall be based on the latest Monthly Schedule Update.
 - b) The submittal shall include all supporting project documentation or delay calculations that establish entitlement and quantify the number of days of anticipated "Inclement Weather" are exceeded in a given month.
 - c) The submittal shall demonstrate the effects on the total float of the Project at the time the event occurred
 - d) The submittal shall demonstrate that the delay must be beyond the control and without the fault of negligence of the Contractor
 - 4) If the requested changes are reviewed and found acceptable, the schedule revision shall be made and incorporated into the project schedule prior to the next Monthly Schedule Update submittal.
 - a) The Contractor will become eligible for an excusable, non-compensable time extension for "Unusually Severe Weather".

c. Mud Days:

- Provide "Mud Days" Submittal to the Architect for all claimed time extension requests, showing the impact of the delay event on the contract schedule. Refer to the "sample" "Notice of Mud Days" form provided herein
- 2) Submit as a Change Order Request (COR).
- 3) The Submittal shall demonstrate the time impact based on the date(s) and durations of the delay event, the status of construction at that point in time, and the effect on the scheduled sequence and progress of the Critical Path Activities.
 - a) The Submittal shall be based on the latest Monthly Schedule Update.
 - b) The Submittal shall include all supporting project documentation or delay calculations that establish entitlement and quantify the number of days of anticipated "Mud Days" are exceeded in a given month.
 - c) The Submittal shall demonstrate the effects on the total float of the Project at the time the event occurred.
 - d) The Submittal shall demonstrate that the delay must be beyond the control and without the fault of negligence of the Contractor.
- 4) If the requested changes are reviewed and found acceptable, the schedule revision shall be made and incorporated into the project schedule prior to the next Monthly Schedule Update Submittal.
 - a) The Contractor will become eligible for an excusable, non-compensable time extension for "Mud Days".

3.2 SCHEDULES

A. List of attached Forms and Reports.

- Meteorological Data Chart. Notice of Delay Form. Inclement Weather Form. 1.
- 2.
- THE REST OF THIS PAGE IS INTENTIONALLY BLANK -

EXAM	PLE•						
Meteoro	ological D	ata for F	resno, Cal	ifornia			
	s, Means a						
TEMPERATURE (degrees F)					PRECIPITATION**	**	FOG
	Normal		Extreme	S			
Mont	Daily	Daily	Record	Record	Mean*	Norma	Mean**
h	Max.	Min.	Highes	Lowest	Number Calendar /	1 (in)	Number Calendar / Work
			t		Work		
					Days per Month		Days per Month
Jan	54.1	37.4	78	19	7.5/5.4	1.96	11.8/8.4
Feb	61.7	40.5	80	24	7.1/5.1	1.8	6.0/4.3
Mar	66.6	43.4	90	26	7.1/5.1	1.89	1.7/1.2
Apr	75.1	47.3	100	32	4.1/2.9	0.97	0.3/0.2
May	84.2	53.7	107	36	1.9/1.4	0.3	0.1/0.1
Jun	92.7	60.4	110	44	0.7/0.5	0.08	0.0/0.0
Jul	98.6	65.1	112	50	0.2/0.1	0.01	0.0/0.0
Aug	96.7	63.8	111	49	0.3/0.2	0.03	0.1/0.1
Sep	90.1	58.8	111	37	1.0/0.7	0.24	0.1/0.1
Oct	79.7	50.7	102	27	2.2/1.6	0.53	0.9/0.6
Nov	64.7	42.5	89	26	5.2/3.7	1.37	5.8/4.1
Dec	53.7	37.1	76	18	6.7/4.8	1.42	12.1/8.6
Year					44.1/31.5	10.6	38.8/27.7
					ohere Administration.		
* Precipitation of 0.01 inches or more.							
**			ity 1/4 mi				
***			Mud, for r				
					d upon the locality of t		
assembl					for confirmation, revi		
	Obtain data from NOAA (828) 271-4800, or the Local Weather Office.						

⁻ THE REST OF THIS PAGE IS INTENTIONALLY BLANK -

http://www.ncdc.noaa.gov

03/31/2023

NOTICE OF DELAY FORM						
Date:	Submittal No.:					
Date: Sheet	_ of					
To: Darden Architects, 6790 N. West Avenue, Fresno, CA 93711 (559) 448-8051						
Description of Delay: By reference to attached	d schedule, the following delay occur	rred:				
	Continued on Sho	eets of				
Time Extension Requested:	_ work days x 1.4 =	calendar days.				
Time Requested for Activity:	Time Requested for Project:					
Related Documents: The following construction						
RFI Nos.: SI Nos.:						
CCD Nos.:	RFP Nos.:					
Daily Reports Dated:		and attached.				
Project Correspondence Dated:		and attached.				
Other Documentation:						
Schedule-Related Information: By reference to	o the attached Schedule, provide the	following:				
Predecessor Activity:						
Successor Activity:						
Affected CPM Schedule Activities (list IDs ar						

⁻ THE REST OF THIS PAGE IS INTENTIONALLY BLANK -

INCLEMENT WEATHER FORM		
Date:		
From: Name of Contractor Sheet	of	
To: Darden Architects, 6790 N. W	est Avenue, Fresno, CA 93711 (5	559) 448-8051
Description of Delay: the following de	elay occurred:	•
		ued on Sheets of
Time Extension Requested:	work days x 1.4 =	calendar days.
Time Requested for Activity:	Time Requested for Pro	ject:
Related Documents: The following con		
Daily Reports Dated:		and attached.
Project Correspondence Dated:		and attached.
Other Documentation:		
Affected CPM Schedule Activities (lis		
()	r , .	

END OF SECTION

SECTION 013226 - FORMS AND REPORTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Contractor to provide all Forms and Reports as required by the Architect for Administrative Procedures and other related items necessary to document the Project as required by the Contract Documents, including but not limited to those forms provided under this specification section.
 - 2. CalGREEN Forms:
 - a. Contractor shall provide all California Green Building Standards Code Certification Worksheets and other related items necessary to document the Project as required by the AHJ, including, but not limited to, those forms provided under this specification section.
 - Obtain the latest documents from the California Building Standards Commission; revisions may have been made since the publication of this Project Manual.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Forms and Reports as attached to this section when required by the Architect.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. In accordance with Specification Section REGULATORY REQUIREMENTS.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULES

A. Listing of Architect required Forms and Reports

No. of Pages:

- 1. 01 32 26.01-DAILY SUPERINTENDENT'S REPORT 2
- 2. 01 32 26.02-SUBCONTRACTOR'S DAILY REPORT 1
- 3. 01 32 26.03-SHOP DRAWING AND SUBMITTAL TRANSMITTAL 1
- 4. 01 32 26.04-REQUEST FOR INFORMATION (RFI)
- 5. 01 32 26.05-SUPPLEMENTAL INSTRUCTIONS (SI) 1
- 6. 01 32 26.06-REQUEST FOR PROPOSAL (RFP)
- 7. 01 32 26.07-CONSTRUCTION CHANGE DIRECTIVE (CCD) 1
- 8. 01 32 26.08-CHANGE ORDER REQUEST REVIEW (COR) 2
 - a. (Review form provided by the Contractor is subject to review and comments by the Owner and Architect).
- 9. 01 32 26.09-CHANGE ORDER (CO) 1
- 10. 01 32 26.10-FRAGNET SUBMITTAL FORM 1
- 11. 01 32 26.11-APPLICATION FOR PAYMENT (AP)
- 12. 01 32 26.12-CONTRACTOR'S TESTING / INSPECTION REQUEST FORM 1
- 13. 01 32 26.13-CONTRACTOR'S "DEVIATION NOTICE" INSPECTION REPORT FORM 1
- 14. 01 32 26.14-CONTRACTOR'S FINAL INSPECTION REQUEST FORM
- 15. 01 32 26.15-CONTRACTOR'S PUNCHLIST INSPECTION REQUEST FORM 1
- 16. 01 32 26.16-CONTRACTOR'S PUNCHLIST 1
- 17. Periodic field reports issued by the Architect and Engineers.
- 18. Contractor's Punch List Response and Correction form is required for each Punch List Review report, citing the issuing Punch List Review format number(s).
- 19. Completed Contractor's Punch List and Final Inspection Reports issued by the Architect, Engineers and the Owner.
- 20. See the attached Forms and Reports suitable for reproduction by the Contractor or Subcontractor.
- B. Listing of California Green Building Standards Code Certification Worksheets:
 - WORKSHEET (WS-1) BASELINE WATER USE.
 - 2. WORKSHEET (WS-2) WATER USE REDUCTION.
 - 3. CONSTRUCTION WASTE MANAGEMENT (CWM) PLAN (Sample).
 - 4. CONSTRUCTION WASTE MANAGEMENT (CWM) WORKSHEET (Sample).
 - 5. CONSTRUCTION WASTE MANAGEMENT (CWM) ACKNOWLEDGMENT (Sample).

END OF SECTION

(Attachments)

GENERAL CONTRACTOR'S DAILY SUPERINTENDENT'S REPORT

	(JOB NO./REPORT NO.)						_	(DATE/DAY)				
(JOB NAME)							-	WEATHER	DESCRIPT	ΓΙΟΝ			
	(WORK SHIFT) / FROM / TO					(PROJECT MANAGER/SUPERINTENDENT)							
PM/	ENGR/	С	ARPENTER	S	LABOR	ERS	CEM	FINISHERS		OPER ENGR			
SUPT	TK	FMAN	JRMAN	APP	FMAN	LAB	FMAN	JRMAN	APP	JRMAN	APP	OTHER	TOTAL
\angle													
CONCRET	Œ:	CY TODAY:			LOCATION:						CY TC) DATE:	
	WORK REL	EASED BY (
INSTRUCT	ΓΙΟΝS FROI	M ARCHITEC	CT / OWNER	t:									
MATERIAL	.S / EQUIP.	DELIVERED	TO JOB:					INSPECTIO	NS / TEST	S PERFORM	1ED		
SAFETY/	ACCIDENTS	S:						MAJOR EQ	UIP. ON SI	TE:			

BACKSIDE OF GENERAL CONTRACTOR'S REPORT

SUBCONTRACTORS ON JOB	NO. OF MEN	FOREMAN'S NAME	WORK DESCRIPTION / LOCATION
		1	
IAJOR EQUIPMENT ON SITE:			
A OK OLIA DOEG			
ACK CHARGES:			

SUBCONTRACTOR'S DAILY REPORT

PROJECT:		DATE:				
SHIFT TIME	FOREMAN:		WEATHER:			
WORK DESCRIPTION AND LOCATION:						
SUB-SUBCONTRACTOR	CREW SIZE	CRAFT	WORK DESCRIPTION / LOCATION			
SOB-SOBGONINACTOR	OKEW SIZE	ORALI	WORK BESCHI HON / ESCATION			
DELAYS:	!	<u> </u>	!			
CHANGE ORDERS / EXTRA WORK ORDERS:						
INSTRUCTIONS RECEIVED FROM GC:		TESTS / INSPECTI	ONS PERFORMED:			
MATERAL / EQUIPMENT DELIVERIES:		MAJOR EQUIPMEN	NT ON SITE:			

SAFETY / ACCIDENTS:

SHOP DRAWING AND SUBMITTAL TRANSMITTAL

DESCRIPTION:		SUBMITTAL NO.: SPEC SECTION:	
ARCHITECT: Darden Architects 6790 N. West Ave Fresno, California 93711	PROJECT:		
CONTRACTOR:	SUPPLIER:		
	Substitution:	Yes: DSA Approval Re	q'd
DATE RECEIVED:	NO. RECEIVED:	DATE RETURNED:	
Contractor Remarks:			
Other Required Information:	CPM Activity / Submittal Task No.:		
WARRANTY: O and M MANU	Early Start (ES) Date: Early Finish (EF) Date:		
DESIGN CONSULTANT'S RI	EVIEW:		
TRANSMITTED BY ARCHITECT DATE SENT:	Г ТО:	DATE RETURNED:	
NO. SENT:	Consultar	nts Remarks:	
ACTION: NO EXCEPTION TAKEN RELATIVE TO DE NO EXCEPTION TAKEN WITH MODIFICAT AMEND AS NOTED AND RESUBMIT REJECTED AND RESUBMIT SEE ATTACHED LETTER			
ARCHITECT'S REVIEW:	Architect	s Remarks:	
ACTION: NO EXCEPTION TAKEN RELATIVE TO D NO EXCEPTION TAKEN WITH MODIFICATION AND RESUBMIT REJECTED AND RESUBMIT Approved Substitution			
COPIES TO:	r	NATE DETUDNED.	
Contractor: Owner		DATE RETURNED: File: Other:	



6790 N. West Avenue Fresno, California 93711

Tel: 559.448.8051 Fax: 559.446.1765

Pages Attached:

REC	QUEST FOR INF	ORMATION		www.dardenarchitect
To:	Darden Architects		Date:	
	6790 N. West Ave Fresno, California 93711		Respond By:	
Attn:			Architect Proje	ect No.
DSA/HC Required		pprd	Project:	
	RMATION REQUEST	LU.		
Cost Im	npact:		Signature:	
Schedu	ıle Impact:	Days		Pages Attached:
Trade/0	Contractor:	Sched	ule Task No/Item:	
Docume indicates If the Co shall not	onts without change in the Contra- is your acknowledgement that the ontractor considers that this suppl	ct Sum or Contract Time. Fre will be no change in the elemental instruction required promptly submit an itemiz	Proceeding with the Work Contract Sum or Contract s a change in the Contrac ed proposal to the Archite	et Sum or Contract Time, the Contractor ect for doing this work. If your proposal is
Refere	d To:		Refered Date:	Return Date:
SUPF	PLEMENTAL INSTRU	CTIONS:		



6790 N. West Avenue Fresno, California 93711

Tel: 559.448.8051 Fax: 559.446.1765

www.dardenarchitects.com

SUPPLEMENTAL INSTRUCTIONS

PROJECT:	SUPPL. INST. NO.:
	DATE OF ISSUANCE:
OWNER:	CONTRACT DATE:
	NOTICE TO PROCEED:
CONTRACTOR:	Architect Project No.: DSA Appl. No.: DSA File No.: OPSC Appl. No.: HCAI No.:
	with the following supplemental instructions issued in accordance with the Contract Documents without. Proceeding with the Work in accordance with these instructions indicates your acknowledgement that or Contract Time.
proceed with this Work and shall promptly sul	ntal instruction requires a change in the Contract Sum or Contract Time, the Contractor shall not bmit an itemized proposal to the Architect for doing this work. If your proposal is found to be struction will be superceded by a Construction Change Directive.
Description:	
Trade/Contractor: Attachments:	Schedule Task No/Item:
Darden Architects, Inc.	
Issued By:	
Architect	
	PECTOR TESTING LAB TSTRUCTURAL MECHANICAL ELECTRICAL OTI



6790 N. West Avenue Fresno, California 93711

Tel: 559.448.8051 Fax: 559.446.1765

www.dardenarchitects.com

REQUEST FOR PROPOSAL

PROJECT:	REQUEST FOR PROPOSAL NO.:
	DATE OF ISSUANCE:
OWNER:	CONTRACT DATE:
	NOTICE TO PROCEED:
CONTRACTOR:	Architect Project No.: DSA Appl. No.: DSA File No.: OPSC Appl. No.: HCAI No.:
	Sum and Contract Time for proposed modifications to the Contract Documents tect in writing of the date on which you anticipate submitting your proposal.
This is not a Change Order, Construction Change Directive, or a	a direction to proceed with the Work described in the proposed modifications.
Description:	
Attachments	
Darden Architects, Inc.	
ISSUED BY:	
Architect	
OWNER CONTRACTOR ARCHITEC	T CONSULTANT INSPECTOR OTHER



6790 N. West Avenue Fresno, California 93711

Tel: 559.448.8051 Fax: 559.446.1765

www.dardenarchitects.com

PROJECT:		DIRECTIVE NO.:		
		DATE OF ISSUANCE:		
OWNER:		CONTRACT DATE:		
		NOTICE TO PROCEED:		
CONTRACTOR:		Architect Project No.: DSA Appl. No.: DSA File No.: OPSC Appl. No.: HCAI No.:		
	CONTRACT ADJUSTM the Contract Sum or Guaranteed Maximum Price			
Lump Sum				
Lump Sum Unit Price of	the Contract Sum or Guaranteed Maximum Price	e is:		
Lump Sum Unit Price of As provided for in General C		e is:		
Lump Sum Unit Price of	the Contract Sum or Guaranteed Maximum Price	e is: e contract.		
Lump Sum Unit Price of As provided for in General C As Follows: The Contract Time is proposed to When signed by the Owner and Archite	the Contract Sum or Guaranteed Maximum Price Conditions and the Supplemental Conditions of the (be adjusted). The proposed adjustment, ct and received by the Contractor, this ATELY as a Construction Change Directive	e is: e contract.		
Lump Sum Unit Price of As provided for in General C As Follows: The Contract Time is proposed to When signed by the Owner and Archite ocument becomes effective IMMEDIA	the Contract Sum or Guaranteed Maximum Price Conditions and the Supplemental Conditions of the (be adjusted). The proposed adjustment, ct and received by the Contractor, this ATELY as a Construction Change Directive	e contract. if any, is increase of		
Lump Sum Unit Price of As provided for in General C As Follows: The Contract Time is proposed to When signed by the Owner and Archite ocument becomes effective IMMEDIACCD), and the Contractor shall proceed	Conditions and the Supplemental Conditions of the (be adjusted). The proposed adjustment, ct and received by the Contractor, this ATELY as a Construction Change Directive d with the change(s) described above.	e contract. if any, is increase ofdays) Signature by the Contractor indicates the Contractor agreement with the proposed adjustments in Contractor Sum and Contract Time set forth in this Construction Change Directive.		
Lump Sum Unit Price of As provided for in General C As Follows: The Contract Time is proposed to When signed by the Owner and Archite ocument becomes effective IMMEDIACCD), and the Contractor shall proceed	Conditions and the Supplemental Conditions of the (be adjusted). The proposed adjustment, ct and received by the Contractor, this ATELY as a Construction Change Directive d with the change(s) described above.	e contract. if any, is increase ofdays) Signature by the Contractor indicates the Contractor agreement with the proposed adjustments in Contractor Sum and Contract Time set forth in this Construction Change Directive.		
Lump Sum Unit Price of As provided for in General C As Follows: The Contract Time is proposed to When signed by the Owner and Archite ocument becomes effective IMMEDIACCD), and the Contractor shall proceed ARCHITECT Darden Architects	Conditions and the Supplemental Conditions of the (be adjusted). The proposed adjustment, ct and received by the Contractor, this ATELY as a Construction Change Directive d with the change(s) described above.	e contract. if any, is increase ofdays) Signature by the Contractor indicates the Contractor agreement with the proposed adjustments in Contractor Sum and Contract Time set forth in this Construction Change Directive.		
Lump Sum Unit Price of As provided for in General C As Follows: The Contract Time is proposed to When signed by the Owner and Archite document becomes effective IMMEDIA CCD), and the Contractor shall proceed ARCHITECT Darden Architects 6790 N. West Ave	Conditions and the Supplemental Conditions of the (be adjusted). The proposed adjustment, ct and received by the Contractor, this ATELY as a Construction Change Directive d with the change(s) described above.	e contract. if any, is increase ofdays) Signature by the Contractor indicates the Contractor agreement with the proposed adjustments in Contractor Sum and Contract Time set forth in this Construction Change Directive.		



6790 N. West Ave

Fresno, California 93711

Tel: 559.448.8051

Fax: 559.446.1765

CHANGE ORDER REQUEST REVIEW

www.dardenarchitects.com

PROJECT:	CHANGE ORDER REQUEST NO.:			
	DATE OF ISSUANCE:			
OWNER:				
CONTRACTOR:	Architect Project No.: DSA Appl. No.: DSA File No.: OPSC Appl. No.: HCAI No.:			
DESCRIPTION OF PROPOSED CI Scope:	IANGE: Requested By:			
Necessary for:				
DESIGN CONSULTANT'S REVISACTION: NO EXCEPTION TAKEN RELATIVE TO COST NO EXCEPTION TAKEN RELATIVE TO TIME AMEND AS NOTED AND RESUBMIT REJECTED	Date Sent: Referred To: Date Returned: Consultants Remarks			
ARCHITECT'S REVIEW:	Date Returned:			
ACTION: NO EXCEPTION TAKEN RELATIVE TO COST NO EXCEPTION TAKEN RELATIVE TO TIME AMEND AS NOTED AND RESUBMIT REJECTED Attachments:	Architects Remarks:			
REVIEWED: Darden Architects 6790 N. West Ave Fresno, California 93711	APPROVED:			
Darden Architects : Date :	Owner: Date:			

CHANGE ORDER REQUEST NO.

Project Architect's Project No.:

CHANGE ORDER REOUEST-BREAKDOWN WORKSHEET

Proposal Request Administration Construction Administration				\$0.00 \$0.00	
ARCHITECTURAL ADMINIST					
TOTAL DAYS:				0	
TOTAL COST:				\$0.00	
TOTAL COST:				\$0.00	
TOTAL:				\$0.00	
Profit		\$0.00		\$0.00	
Overhead		\$0.00			
Material, Equipment, & La	bor	\$0.00			
Labor	\$0.00				
Equipment	\$0.00				
ADDITIONAL WORK PERFO Contractor Materials	RMED BY CONT \$0.00	RACTOR			
TOTAL:				\$0.00	
Profit			\$0.00		
Contractor Overhead			\$0.00		
			φυ.υυ		
Profit Sub Total:		\$0.00	\$0.00		
Material, Equipment, & La Overhead	lbor	\$0.00 \$0.00			
Labor	\$0.00				
Equipment	\$0.00				
ADDITIONAL WORK PERFO Sub-Contractor Materials	RMED BY SUB-C \$0.00	CONTRACTOR			
TOTAL:				\$0.00	
Material, Equipment, & La		\$0.00			
Labor	\$0.00				
	Φ0.00				
WORK DELETED: Contractor Materials Equipment	\$0.00 \$0.00				

\$0.00

\$0.00

TOTAL:

DSA Fees:



By:

Date:

☐ OWNER

 \square CONTRACTOR

6790 N. West Avenue Fresno, California 93711

Tel: 559.448.8051 Fax: 559.446.1765

			www.dardenarchitects.c
CHANGE ORDER			
PROJECT:		CHANGE ORDER NO.:	
]	DATE OF ISSUANCE:	
OWNER:		CONTRACT DATE:	
]	NOTICE TO PROCEED) :
CONTRACTOR:]] (Architect Project No.: DSA Appl. No.: DSA File No.: DPSC Appl. No.: HCAI No.:	
The Contract is changed as follows:			
Description:			
It is mutually agreed that the affixed changes defined herein have been sa compensation either monetarily or vi	tisfied with the execution of this doc	cument. Furthermore, no add	itional
The Original Contract Sum and Contrac	et Completion Date:		
Net change (Contract Sum and Contract	_		days
Contract Sum and Contract Completion	= -		
Contract Sum and Contract Time (increa			days
New Contract Sum and Contract Comple	etion Date including this Change Order:		
CONTRACTOR	ARCHITECT	OWNER	
	Darden Architects		
	6790 N. West Ave		

 $\ \ \, \bigsqcup \ \, CONSULTANT$

By:

Date:

☐ INSPECTOR

☐ OTHER

Fresno, California 93711

By:

Date:

☐ ARCHITECT

FRAGNET SUBMITTAL FORM

Date:		Sheet	of
From:		Fragnet No	.:
To: Darden Architects, Inc.			
Description of Delay: By reference	e to attached schedule fragnet, th	ne following	delay occurred:
	Continued on Sheets		of
Time Extension Requested:		wds,	cds.
Time Requested for Activity:	Time Requested for Project:		
Related Documents: The following	g construction documents provid	le evidence o	of the delay event:
RFI Nos.:	SI Nos.:		
CCD Nos:	RFP Nos.:		
D-11 D-11 D-41-			and attached.
Project Correspondence Dated:			and attached.
Other Documentation:			
Schedule-Related Information: By	reference to the attached fragne	t, provide th	e following:
Predecessor Activity to Fragnet:			
Successor Activity to Fragnet:			
Affected CPM Schedule Activities	s (list IDs and descriptions):		
New CPM Schedule Activities (list	et IDs and descriptions):		
	END OF FORM		

APPLICATI	ON FOR PAY	MENT			
To:		Project:			
DARDEN A	RCHITECTS,	, INC.		Pay Application No.:	Distribution to:
6790 N. Wes					Owner:
Fresno, CA	93711	Bid Pa	ackage No	Application Date:	Architect:
					Contractor:
FROM		Prime Contractor		Period Ending:	Const Mgr.:
		Prime Contractor			Inspector:
Address:				Phone:	
CONTRACT	TOR'S APPLIC	ATION FOR PAYMENT		The present status of the account for this Contract is	s as follows:
		NGE ORDER SUMMARY		The present states of the decement for this continue in	, 4 5 15116 W.S.
APPROVED	CHANGE OR			ORIGINAL CONTRACT SUM	\$
Change	Approved				
Order No.:	Date:	Amount:			
		\$		Net Change by Change Orders	\$
		\$			
		\$		CONTRACT SUM TO DATE:	\$
		\$			
		\$		TOTAL COMPLETE & STORED TO DATE:	\$
		\$			
		\$		RETAINAGE:%:	\$
		\$			•
TOTALS	GI 0.1			TOTAL EARNED LESS RETAINAGE:	\$
Net change by	Change Order	\$		LESS STOP NOTICE(S):	\$
The undersion	ed Contractor cer	tifies that in the best of his knowledge, infor	mation	LESS STOP NOTICE(S).	\$
		this Application for Payment has been comp		LESS PREVIOUS PAYMENT:	\$
accordance wi	th the Contract D	ocuments, that all amounts have been paid b	y the	EBS TRE VIOUS TITINERVI.	V
		revious Certificates for Payment were issued		CURRENT PAYMENT DUE:	\$
payment recei	ved from the Own	ner and that current payment show herein is	now due.		-
Contractor:				This Certificate is not negotiable. This AMOUNT	CERTIFIED is payable only to
				the Contractor named herein, issuance, payment an	
			DATE:	without prejudice to any rights of the Owner or Co	ntractor under this contract.
CONTRACT	Γ ∩ Ρ∙			CONSTRUCTION MANAGER:	
CONTRACT	OK.		DATE:	CONSTRUCTION MANAGER.	DATE:
			DATE.		DATE.
INSPECTOR	₹:			ARCHITECT:	
			DATE:		DATE:

CONTRACTOR'S TESTING / INSPECTION REQUEST FORM

<u>PROJECT:</u>			
DATE RECEIVED:	(by Inspec	ctor)	
TIME RECEIVED:	(by Inspec	ctor)	
BUILDING:			
SITE/OFFSITE:			
CONSTRUCTION PHASE (1, 2, 3, etc.):			
SPECIFICATION SECTION (No.):			
PLAN SHEET AND DETAIL:			
SCOPE OF WORK:			
SCOLL OF WORK.	(concrete, electri	cal, etc.)	
INSPECTION REQUESTED BY:			
	(contract	or name)	
LOCATION (bldg., room, floor, wall, ceil	ling, etc.)		
TYPE OF INSPECTION (concrete, frami	ng, welding, mason	ry, electric	al, etc.)
INSPECTION REQUESTED ON:		at	am/pm
	(date)	(1	time)
Note 1: A Minimum Notice of 48 hours is	-	•	-
Officer Prior to the Time the Testing / Ins	pection is Requested	d to Begin.	
PRINT NAME AND TITLE OF PERSON	N REQUESTING IN	SPECTIO	N
SIGNATURE OF PERSON REQUESTIN	IG INSPECTION		
Note 2: Contractor Must Accompany Insp	ector on Inspection	, if Request	ted.
PASSED:	FAILED	:	
Note 3: See Attached Sheet for Explanation	on if Inspection Fail	ed. Re-insp	pection Required.
INSPECTOR SIGNATURE:		Date	:

CONTRACTOR'S "DEVIATION NOTICE" INSPECTION REQUEST FORM

PROJECT:	
DATE RECEIVED:	(by Inspector)
TIME RECEIVED:	(by Inspector)
DEVIATION NOTICE(S) (No.):	
BUILDING:	
SITE/OFFSITE:	
CONSTRUCTION PHASE (1, 2, 3, e	 etc.):
SCOPE OF WORK:	
	(concrete, electrical, etc.)
INSPECTION REQUESTED BY:	
	(contractor company name)
LOCATION(S) OF WORK FOR INS	SPECTION (be specific-bldg.(s), room(s), etc.)
INSPECTION REQUESTED ON:	at am/pm
	(date) (time)
	ars is Required to be Received by the Inspection
Officer Prior to the Time the Deviati	on Notice" Inspection is Requested to Begin.
PRINT NAME OF PERSON REQUE	ESTING DEVIATION NOTICE INSPECTION
SIGNATURE OF PERSON REQUES	STING DEVIATION NOTICE INSPECTION
- · · · · · · · · · · · · · · · · · · ·	Project Inspector on " <u>Deviation Notice"</u> Inspection,
if Requested.	
Note 2. Con Attached "Deviction Not	ion!! for Inspector?s Comments and/or Data
Completed.	ice" for Inspector's Comments and/or Date
Completed.	
PASSED:	FAILED:
	17MDD.
PROJECT INSPECTOR SIGNATUR	RE.
DAT	

CONTRACTOR'S FINAL INSPECTION REQUEST FORM

PROJECT:			
DATE RECEIVED:	(by Insp		_
TIME RECEIVED:	(by Insp	pector)	
BUILDING:			
SITE/OFFSITE:			
CONSTRUCTION PHASE (1, 2, 3,	etc.):		
SPECIFICATION SECTION (No.):			
SCOPE OF WORK:			
	(concrete, electrical, e	etc.)	
INSPECTION REQUESTED BY:			
n tor Berron (12 QeBerra) Bri	(contractor co	mpany name)	
INSPECTION REQUESTED ON:		at	am/pm
	(date)		me)
Notified by the Construction Manage Final Inspection. PRINT NAME AND TITLE OF PER			
	01 (111		
SIGNATURE OF PERSON REQUE	STING FINAL INSPE	ECTION	
Note 2: Contractor Must Accompany Final Inspection, if Requested.	Project Inspector, Arc	chitect and/or E	Engineer(s) on
PASSED:	FAILE	ED:	
Note 3: If the Final Inspection Fails I Comment(s).	Re-Inspection is Requi	red. See Attach	ned Sheet for
PROJECT INSPECTOR SIGNATUL	RE:		
DA			
PROJECT ARCHITECT SIGNATU	RE:		
DA	TE:		

CONTRACTOR'S PUNCHLIST INSPECTION REQUEST FORM

	PROJECT:			
DATE RECEIVED:		(by Inspe	ector)	<u> </u>
TIME RECEIVED:		(by Inspe	ector)	
BUILDING:				
SITE/OFFSITE:				
	UACE (1.2.2.a			
CONSTRUCTION P	*	etc.):		
SPECIFICATION SE	ECTION (No.):			
SCOPE OF WORK:				
		(concrete, electrical, etc	c.)	
INSPECTION REQU	JESTED BY:			
		(contractor com	ipany name)	
LOCATION(S) OF V	VORK FOR INS	SPECTION: (be specifi	c- bldg.(s), ro	oom(s), etc.)
DESCRIPTION OF V	WORK TO BE I	NSPECTED: (item nur	mber(s) from	punchlist)
		<u> </u>		*
INSPECTION REQU	JESTED ON:		at	am/pm
11,01201101,1120	,22,122 01,1	(date)		me)
Note 1: A Minimum	Notice of 48 hor	ars is Required to be Re	`	<i>'</i>
		st Inspection is Request		c mspection
		st inspection is request	ou to Begin.	
PRINT NAME OF P	ERSON REQUE	ESTING PUNCHLIST	INSPECTIO	N
SIGNATURE OF PE	RSON REQUE	STING PUNCHLIST I	NSPECTION	1
· · · · · · · · · · · · · · · · · · ·		Project Inspector on Pu	-	ection, if
Requested. Items Mu	st Have Already	Been Signed Off by C	ontractor.	
· · · · · · · · · · · · · · · · · · ·		r's Signoff and/or Inspe		nents and/or
Date Completed for t	he Specific Punc	chlist Items Noted Abov	ve.	
-		NAL INSPECTION bu	t Only an Ac	knowledgement
That a Particular Item	n(s) is/are comple	eted.		

PROJECT:	CONTRACTOR'S PUNCHLIST		
CONTRACTOR NAME:	Page	of	

ITEM NO.	DESCRIPTION	BUILDING &	FLOOR	CEILING	WALLS	DATE	SIGNOFF/
		ROOM NO.			N. S. E. W.	OBSERVED	COMMENTS
]							

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely provide all required submittals and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 SUBMITTALS

- A. Request for Electronic Files:
 - 1. Submit in accordance with the following:
 - a. Contractor's Usage Agreement for Electronic Files:
 - 1) See attachment.
- B. Contractor's responsibilities:
 - 1. The Contractor shall check, verify, and be responsible for all field measurements.
 - 2. The Contractor shall submit a schedule indicating when the required shop drawings and submittals will be submitted to the Architect.
 - a. Submit schedule within the amount of days as indicated in Specification Section CONSTRUCTION SCHEDULES.
 - 3. Submit copies as scheduled below, checked and approved by the Contractor for all submittals required for the work of the various trades. Deliver submittals promptly to avoid delays in delivery of materials or execution of the work.
 - a. The Contractor (or Subcontractor) shall mark-up the submittals as to project specifics. If the specifications contains a schedule prepared by the Architect (i.e. paint symbols such as DW-1, M-1, CB-1, etc., or tile symbols such as CT-1,CT-2, or IWA, IWB, IWC, etc.), then the submittal will also contain those designations. Submittals without project specifics will be returned to the Contractor as not being properly prepared.
 - b. The Contractor shall stamp the Submittals utilizing any language requested by the Owner in the General Conditions and the following minimum language:

"This submittal has been reviewed by (Name of Contractor) and approved with respect to the means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incidental thereto. The Contractor has reviewed and approved not only the field dimensions, but the construction criteria, and has also made written notation regarding any information in the Shop Drawings that does not conform to the Contract Documents. The Contractor has reviewed this submittal and coordinated with all other Shop Drawings received to date by the Contractor and this duty of coordination has not been delegated to subcontractors, material suppliers, the Architect, or the design

consultants on this project. The Contractor shall also have indicated that it has not relied upon the dimensions shown on the drawings, specifications and schedules, and that the Contractor has double-checked all dimensions for accuracy and fit. (Name of Contractor) also warrants that this submittal complies with the Contract Documents and comprises no variation thereto."

Ву:	Contractor's Signature		
		Contractor's Typed Name	
Date:			
	c.	Substitutions on shop drawings or in product submittals will not be considered without prior approval in accordance with Specification Section - SUBSTITUTION PROCEDURES. Submittals containing unacceptable items will be rejected.	
	d.	The Contractor shall make any corrections required by the Architect during the	

Architect's responsibilities:

C.

review and distribution.

1. The Architect will make any desired corrections with reasonable promptness, and return the submittal to the Contractor.

Architect's initial review, and re-submit the required corrected copies for final

- The Architect's review of such drawings or schedules shall not relieve the Contractor of
 responsibility for deviations from the drawings or specifications, unless he has, in
 writing, called the Architect's attention to such deviations at the time of submission, and
 secured written acceptance.
 - a. The Architect's review shall be for general conformance with the design concept for the project and general compliance with the information given in the Contract Documents.
 - b. The Architect's review shall not be construed as an "approval," or to relieve the Contractor(s) and material suppliers of responsibility for errors or omissions in the submitted documents.
 - c. Modifications or comments made on the submittals or shop drawings during this review do not relieve the Contractor from compliance with the requirements of the drawings and specifications.
 - d. Acceptance of a specific item does not include acceptance of the assembly of which the item is a component.
- D. The following list of items, definitions and required quantities is a minimum required for this project. Verify with FACILITY SERVICES SUBGROUP sections for additional quantities required within those divisions.
 - 1. Product Data: Illustrations, standard schedules, performance charts, instructions, brochures, diagrams, other product information, color choices and/or manufacturer's catalog sheets shall be specially prepared for the Project (marked-up with project specifics) and shall be submitted in sequential sets for each category of work:
 - a. Quantity:
 - 1) Unless otherwise indicated in the Contract Documents, provide Six (6) sets.
 - b. Material Safety Data Sheets (MSDS): MSDS are not required, but it is recognized that applicable federal and state laws require the submission of these data sheets to an Owner. MSDS shall be turned over to the Owner (without review by the Architect or it's consultants) in compliance with federal and state laws.

- 2. Shop Drawings: Newly prepared information, drawn to accurate scale, consisting of drawings, diagrams, schedules, and other data specifically prepared for the Project by the Contractor, a Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Project. Do not reproduce Contract Documents or copy Standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.
 - a. Quantity: Provide One (1) reproducible original (vellum, sepia or mylar) and Three (3) opaque (blue-line or black-line xerographic) prints for each sheet or detail.
 - 1) The contractor shall receive the marked-up reproducibles and copy the required number of sets to the subcontractor, manufacturer's and/or material suppliers.
 - b. Contractor's use of Architect's Electronic CAD Files.
 - 1) Upon written request by Contractor, copies of the Architect's electronic CAD files may be available for Contractor's use in connection with this Project.
 - a) Contractor's written request shall be on the Architect's "Contractor's Document Usage Agreement for Requested Documents" and may include an additional Architect's Consultant's Agreements, outlining conditions for providing files.
 - b) Contractor's request shall be limited to drawings directly applicable to the Shop Drawings the Contractor wishes to create for submittal.
 - c) Contractor shall pay the Architect for work incurred for providing the requested files. Payment shall be submitted with the request.
 - 2) The Architect's electronic CAD files are limited to files that already exist and that not all files may be available at the Architect's and Architect's Consultant's discretion.
 - 3) The Architect's electronic CAD files are not part of the Contract Documents and have limitations to the accuracy, incorporating modifications, CAD system formats, CAD entity attributes and layering.
 - 4) The Architect's electronic CAD files have restrictions on Contractor's use, transmittal and delivery of files.
- 3. Samples: Physical examples specially prepared for the Project (marked-up with project specifics) which illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged.
 - a. Quantity:
 - 1) Unless otherwise indicated in the Contract Documents, provide Four (4) sets.
 - b. Color samples shall be submitted on 8-1/2" x 11" cards for all colors scheduling paint types specified utilizing the paint symbols designated by the Architect in the drawings and specifications.
 - c. Manufactured devices or equipment items:
 - 1) Quantity: One (1) sample, returned to supplier and which, when approved, may be incorporated into the Project.
- 4. Quality Assurance/Control submittals: Consists of design data, test reports, certificates, manufacturers instructions, and /or manufacturer's field reports.
 - a. Quantity:
 - 1) Unless otherwise indicated in the Contract Documents, provide Six (6) sets.
- 5. Closeout submittals: Maintenance data, operating manuals, project documents, engineering calculations, and/or warranties shall be submitted when required in the various specification sections:
 - a. Quantity:
 - 1) Unless otherwise indicated in the Contract Documents, provide Two (2) sets.

- 6. Field Samples: Sample panels of in place construction, or selected area of completed substrates or work showing the anticipated compliance with specified characteristics in order to establish a standard of quality.
 - a. Quantity:
 - 1) See specific specification section requirements.
- 7. Mockups: Full-sized erected assemblies, used for coordination purposes or for testing in a laboratory, or required for approval in a finish form before the actual Project construction begins.
 - a. Quantity:
 - 1) See specific specification section requirements.
- E. Substitution, Dispute or Claim Submittals:
 - Any substitution, dispute or claim submittals relating to this contract, or any Contract breach, which are not disposed of by agreement shall be promptly submitted in accordance with the GENERAL CONDITIONS, as a claim to and decided by the Architect who shall issue a written decision on the dispute.
 - 2. Adequate supporting data shall include, but is not limited; a statement of the reasons for the asserted entitlement, the certified payroll, invoice for material and equipment rental, and an itemized breakdown of any adjustment sought.
 - 3. If no "SUBMISSION UNDER PENALTY OF PERJURY" clause is provided within the GENERAL CONDITIONS, then the Contractor shall certify, at the time of submission of a substitution, dispute or claim, as follows:

(The rest of this page is left intentionally blank)

SUBMISSION UNDER PENALTY OF PERJURY

I	, being the(Must be an officer),
	declare under penalty of perjury under the laws of the State of California, and do personally certify and attest that: I have thoroughly reviewed the attached substitution, dispute or claim for additional compensation and/or extension of time, and know its contents, and said claim is made in good faith; the supporting data is truthful and accurate; that the amount required accurately reflects the contract adjustment for which the Contractor believes the Owner is liable; and further, that I am familiar with California Government Code Section 12650, et seq, pertaining to false claims, and further know and understand that submission of certification of a false claim may lead to fines, imprisonment and/or other
	severe legal consequences. By:Contractor's Signature
	Contractor's Typed Name
D	Date:

Submission of a substitution, dispute or claim, properly certified, with all required supporting documentation, and written rejection or denial or all or part of the claim by Owner, is a condition precedent to any action, proceeding, litigation, suit or demand for arbitration by Contractor.

(This page is left intentionally blank)

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULES

- A. Usage Agreement For Electronic Documents:
 - 1. Contractor's Usage Agreement for Electronic Files:
 - See attachment.
- B. The following schedule was prepared to assist the Contractor in knowing the required submittals for this project, but may not be complete. Specific submittal information as to what is required is contained within the individual specification sections and those individual sections shall govern in the event of a question.
- C. SUBMITTAL SCHEDULE
 - 1. 01 11 13 SUMMARY OF WORK
 - a. QUALITY ASSURANCE/ CONTROL SUBMITTALS
 - 2. 01 25 00 SUBSTITUTION PROCEDURES
 - a. SUBSTITUTION REQUEST FORMS
 - 3. 01 29 73 SCHEDULE OF VALUES
 - a. SCHEDULE OF VALUES
 - 4. 01 32 16 CONSTRUCTION SCHEDULES
 - a. CONSTRUCTION SCHEDULE, SHOP DRAWING SUBMITTAL SCHEDULE, CRITICAL PATH SCHEDULES, FRAGNETS.
 - 01 32 26 FORMS AND REPORTS
 - a. AS REQUIRED BY THIS SPECIFICATION SECTION AND OTHER SPECIFICATION SECTIONS.
 - 6. 01 33 00 SUBMITTAL PROCEDURES
 - a. SHOP DRAWING AND SUBMITTAL SCHEDULE, COLOR SAMPLES OF ALL FINISH MATERIALS FOR COLOR BOARD SELECTION.
 - 7. 01 45 29 TESTING LABORATORY SERVICES
 - a. TESTING SCHEDULE, TEST REPORTS
 - 8. 01 71 23 FIELD ENGINEERING
 - a. COORDINATION DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
 - 9. 01 78 36 WARRANTIES
 - a. ALL GUARANTEES AND WARRANTIES
 - 10. 01 78 39 PROJECT DOCUMENTS
 - a. PROJECT "AS-BUILT" DOCUMENTS, PROJECT "RECORD" DOCUMENTS AND PROJECT "CERTIFICATION" DOCUMENTS.
 - 11. 03 11 01 CONCRETE FORMWORK
 - a. PRODUCT DATA, SAMPLES, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
 - 12. 03 15 14 DRILLED ANCHORS
 - a. PRODUCT DATA, ICC EVALUATION SERVICE REPORTS, DSA APPROVAL LETTERS.
 - 13. 03 20 00 REINFORCEMENT

- a. SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
- 14. 03 30 00 CAST-IN-PLACE CONCRETE
 - a. PRODUCT DATA, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
- 15. 03 35 10 POLISHED CONCRETE FINISHING
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/ CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
- 16. 05 12 00 STEEL AND FABRICATIONS
 - a. PRODUCT DATA, SHOP DRAWINGS, SAMPLES, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS.
- 17. 06 10 00 ROUGH CARPENTRY
 - a. PRODUCT DATA, CERTIFIACTES OF COMPLIANCE, AND WARRANTIES.
- 18. 06 41 23 MODULAR CASEWORK
 - a. SHOP DRAWINGS, MANUFACTURER'S SPECIFICATIONS, COLOR SAMPLES, MOCK-UP, WI CERTIFICATION.
- 19. 07 31 13 SHINGLES
 - a. PRODUCT DATA, SHOP DRAWINGS, SAMPLES, CLOSOUT SUBMITTALS.
- 20. 07 51 13 BUILT-UP ROOFING
 - a. PRODUCT DATA, SHOP DRAWINGS AND WARRANTIES.
- 21. 07 72 00 ROOF ACCESSORIES
 - a. PRODUCT DATA, SHOP DRAWINGS, SAMPLES AND WARRANTIES.
- 22. 07 92 00 SEALANTS
 - a. PRODUCT DATA, COLORS AND WARRANTIES.
- 23. 08 11 00 METAL DOORS AND FRAMES
 - a. PRODUCT DATA AND SHOP DRAWINGS.
- 24. 08 31 13 ACCESS DOORS AND FRAMES
 - a. PRODUCT DATA AND SHOP DRAWINGS.
- 25. 08 33 00 COILING DOORS
 - a. PRODUCT DATA, SHOP DRAWINGS AND WARRANTIES.
- 26. 08 70 00 HARDWARE
 - a. HARDWARE SCHEDULE AND CERTIFICATES.
- 27. 08 80 00 GLASS
 - a. PRODUCT DATA, MATERIALS LIST, SAMPLES AND CERTIFICATES.
- 28. 08 91 00 LOUVERS
 - a. PRODUCT DATA, SHOP DRAWINGS, CERTIFICATES AND COLORS.
- 29. 09 24 00 CEMENT PLASTER
 - a. PRODUCT DATA (INCLUDING INSTALLATION METHODS) AND MATERIALS LIST.
- 30. 09 29 00 GYPSUM BOARD
 - a. PRODUCT DATA, FASTENING SCHEDULE AND SAMPLES.
- 31. 09 30 13 TILE
 - a. PRODUCT DATA, COLORS, SAMPLES, CERTIFICATES, MAINTENANCE MATERIAL AND WARRANTIES.
- 32. 09 51 00 ACOUSTICAL CEILINGS
 - a. ACOUSTICAL TILE SAMPLES, SUSPENSION SYSTEM SAMPLES AND DSA APPROVED CEILING BRACING DRAWINGS.
- 33. 09 65 13 RESILIENT BASE AND ACCESSORIES
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
- 34. 09 65 16 RESILIENT SHEET

- a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
- 35. 09 67 23 RESINOUS FLOORING
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
- 36. 09 68 40 CARPET
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
- 37. 09 91 00 PAINTING
 - a. PRODUCT DATA, MATERIALS LIST, COLORS, MAINTENANCE INFORMATION AND WARRANTIES.
- 38. 10 05 00 MISCELLANEOUS SPECIALTIES
 - a. PRODUCT DATA, COLORS AND SAMPLES (WHERE APPLICABLE) FOR ALL ITEMS.
- 39. 10 11 00 VISUAL DISPLAY BOARDS
 - a. PRODUCT DATA AND SAMPLE COLORS.
- 40. 10 14 00 IDENTIFYING DEVICES
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
- 41. 10 14 53 ROAD AND PARKING SIGNAGE
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
- 42. 10 21 00 TOILET PARTITIONS
 - a. PRODUCT DATA, SHOP DRAWINGS, CERTIFICATES AND COLORS.
- 43. 10 44 00 FIRE PROTECTION SPECIALTIES
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
- 44. 10 51 13 METAL LOCKERS
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, CLOSEOUT SUBMITTALS AND WARRANTIES.
- 45. DIV. 22 PLUMBING SECTIONS
 - a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
- 46. DIV. 23 -HEATING, VENTILATING AND AIR CONDITIONING SECTIONS
 - a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
- 47. DIV. 25- INTEGRATED AUTOMATION SECTIONS
 - a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
- 48. DIV. 26- ELECTRICAL SECTIONS
 - a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
- 49. DIV. 27 -COMMUNICATIONS SECTIONS
 - a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
- 50. DIV. 28- ELECTRONIC SAFETY AND SECURITY SECTIONS
 - a. REFER TO APPROPRIATE SPECIFICATION SECTION REQUIREMENTS.
- 51. 31 20 00 EARTHWORK
 - a. PRODUCT DATA, SHOP DRAWINGS, QUALITY ASSURANCE/CONTROL SUBMITTALS, PROJECT RECORD DOCUMENTS, AND WARRANTIES, AND DRAWINGS SHOWING KNOWLEDGE OF THE EXTENT OF ENGINEERED PADS.

CONTRACTOR'S

USAGE AGREEMENT FOR ELECTRONIC FILES - ELECTRONIC FILE REQUEST FORM

Project Name:	
I I O JOCC I TUILLE	

DA Project No.:	
TO: DARDEN ARCHITECTS, INC.	
6790 N. West Avenue	
Fresno CA 93711	
A. I agent of	as a duly authorized
work on the above project in the following of Lease-Lease Back Agent Construction Manager General Contractor	, have a contract with the Owner to perform rapacity:
B. We hereby submit for your consider	ration a request for Electronic Files on the behalf of
subcontract to perform work on the above na General Contractor Sub-Contractor Others under contract to a sub-contr	
supplemental Agreements. Files requested are specific and are numbers identified, and the total number of	not deemed vague or excessive and with individual sheet
Print Name,	Title
Signature	 Date

CONTRACTOR'S USAGE AGREEMENT

FOR ELECTRONIC FILES

PROJECT NAME:	
DA PROJECT NO.:	
PROJECT ARCHITECT:	
Ι	, as a duly authorized agent
of	(Contractor) have a contract or subcontract to perform
1 0	ne Contractor acknowledges having received at least one (1)
complete set of Contract Documents f	for the project and has posted all Addenda and all other contract
documents issued to date.	

Contractor Document Usage Agreement

The Contractor is requesting the electronic CAD files of work prepared by the Architect and/or Architect's Consultants (Design Team) on the subject project, so that the information therein may be utilized in the Contractor's work on the same project. The Contractor understands that these files are being provided as a courtesy and they are strictly intended for the Contractor's sole convenience and they are not recognized Contract Documents. This request is subject to the following conditions, which the Contractor hereby agrees to abide by:

- 1. It is understood and agreed to that any files and/or documents provided are instruments of professional service by the Design Team and are intended for one-time use solely in the construction of this project. They are and shall remain the property of the Architect or the Architect's Consultants, who is deemed to be the author of the drawings and data, and who shall retain all common law, statutory law, and all other rights, including copyrights.
- 2. The Contractor shall indemnify and hold harmless, the Design Team, its officers, directors, employees or subcontractors, to the fullest extent permitted by law, against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees and defense costs arising out of or resulting from contractor's use of these electronic files, or in any way connected with the modification, misinterpretation, misuse, or reuse by the Contractor or by others.
- 3. The Contractor agrees that by using these electronic files, the Contractor is in no way relieved of the duty to fully comply with the Contract Documents, including and without limitation, the need to check, confirm and coordinate all dimensions and other details, take field measurements, verify field conditions and coordinate with all other contractors for the project.
- 4. It is agreed to that these electronic files are not Contract Documents. Differences may exist between electronic files and corresponding hard-copy Contract documents. The Design Team makes no representation regarding the accuracy or completeness of the electronic files provided to the contractor. In the event that a conflict arises, the signed and sealed hard-copy Contract Documents shall govern. Contractor is responsible for determining if any conflict exists.
- 5. The Contractor understands that the Design Team makes no representation as to the compatibility of these files with Contractor's computer hardware or software. The Contractor understands that the accuracy of the information is an artifact of the techniques used to generate it and is in no way intended to imply actual accuracy. It is also understood that the automated conversion of information and data from the system and format used by the Design Team to an alternate system or format cannot be accomplished without the possibility of introduction of inexactitudes, anomalies and errors.
- 6. Because information presented on the electronic files can be modified, unintentionally or

otherwise, the Design Team reserves the right to edit the drawings to remove information deemed not necessary and/or remove all indications of ownership and/or involvement from each electronic display.

- 7. The Design Team will only furnish those drawings directly applicable to the shop drawings the contractor wishes to create. The Contractor understands that not all electronic files may be available at the Design Team's discretion.
- 8. The Contractor understands that the Architect's Consultants may have Additional Conditions for release of their electronic files or documents, and the Contractor hereby agree to abide by the Consultants conditions in addition to the stated conditions in this agreement. Additional Conditions (if any) are attached to this agreement.
- 9. The Contractor understands that the Architect and the Architect's Consultants will incur certain costs in providing the requested electronic files. The Contractor agrees to pay the Design Team a service fee of \$120.00 per sheet, per delivery, prior to any delivery of the electronic files to compensate the Design Team for the labor to prepare and transmit the files and for the additional risk that this transfer will occasion.
- 10. Under no circumstances shall delivery of the electronic files for use by the Contractor be deemed a sale by the Owner, the Design Team, or any member of the Design Team. The Design Team makes no warranties, either expressed or implied, of merchantability or fitness for any particular purpose. In no event shall the Design Team be liable for any loss of profit or any consequential damages as a result of Contractor's use or reuse of the electronic files.

Iechanical	Electrical Others							
Description of the requested documents and/or CAD files:								
Title								
Dated								
epted								
_								
-								
_								
	Title							

Darden Architects, Inc.

END OF SECTION

© Darden Architects, Inc. 013300 - 11 of 11 06/02/2022

ALTERATION PROJECT PROCEDURES

SECTION 013516 – ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Coordinate the work of trades and schedule elements of alterations and renovation work by procedures and methods to expedite completion of the work.
- C. In addition to demolition specifically shown, cut, move or remove items as necessary to provide access or to allow alterations and new work to proceed. Include such items as:
 - 1. Repair or removal of hazardous or unsanitary conditions.
 - 2. Removal of abandoned items and items serving no useful purpose, such as abandoned piping, conduit and wiring.
 - 3. Removal of unsuitable or extraneous materials not marked for salvage, such as abandoned furnishings and equipment, and debris such as rotted wood, rusted metals and deteriorated concrete.
 - 4. Cleaning of surfaces, and removal of surface finishes as needed to install new work and finishes.
- D. Patch, repair and refinish existing items to remain, to the specified condition for each material, with a smooth and clean transition to adjacent new items of construction.
- E. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 31 12 00 SELECTIVE DEMOLITION
 - 4. 03 30 00 CAST-IN-PLACE CONCRETE
 - 5. 08 11 00 METAL DOORS AND FRAMES
 - 6. 09 24 00 CEMENT PLASTER
 - 7. 09 29 00 GYPSUM BOARD
 - 8. 09 30 00 TILE
 - 9. 09 50 00 ACOUSTICAL CEILINGS
 - 10. 09 91 00 PAINTING
 - 11. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

PART 2 - PRODUCTS

- 2.1 MATERIALS (Products for Patching, Extending and Matching):
 - A. Provide same products or types of construction as that in existing structure as needed to patch, extend or match existing.

ALTERATION PROJECT PROCEDURES

- B. The Contract Documents will not typically define products or standards of workmanship present in existing construction; determine products by inspection and necessary testing, and determine quality of workmanship by using existing as a sample for comparison.
- C. The presence of a product, finish, or type of construction requires that patching, extending or matching shall be performed as necessary to make work complete and consistent with identical standards of quality.

PART 3 - EXECUTION

3.1 REPAIR / RESTORATION

A. Patch and extend existing construction using skilled workers capable of matching existing quality of workmanship. Quality of patched or extended work shall be not less than that specified for new work.

B. Damaged Surfaces:

- 1. Patch and replace portions of existing finished surfaces that are found to be damaged, lifted, discolored, or show other imperfections, with matching material.
 - a. Provide adequate support of substrate prior to patching the finish.
 - b. Refinish patched portions of painted or coated surfaces in a manner to produce uniform color and texture over the entire surface.
 - c. When existing surface finish cannot be matched, refinish entire surface to nearest intersections.

C. Transition from existing to new work:

- 1. When new work abuts or finishes flush with existing work, make a smooth and clean transition. Patched work shall match existing adjacent work in texture and appearance so that the patch of transition is invisible at a distance of five feet.
- 2. When finished surfaces are cut in such a way that a smooth and clean transition with the new work is not possible, notify the Architect. Terminate existing surface in a neat manner along a straight line at a natural line of division, and provide trim appropriate to finished surface, or as otherwise directed by the Architect

3.2 ADJUSTING

- A. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
- B. Where partitions are removed, patch floors, walls, and ceilings with finish materials to match existing.
 - 1. Where removal of partitions results in adjacent spaces becoming one, re-work floors and ceilings to provide smooth and clean planes without breaks, steps, or bulkheads.
 - 2. Where extreme change of plane of one inch or more occurs, request instruction from the Architect as to method of making transition.
- C. Trim and refinish existing doors as necessary to clear new floor finishes.

ALTERATION PROJECT PROCEDURES

3.3 CLEANING

- A. Clean in accordance with Specification Section PROJECT CLOSEOUT.
 - 1. Leave area level and free of any ruts or debris. Appearance of earth surface shall be equal to or better than adjacent undisturbed surfaces.
 - 2. Clean any soiled surfaces immediately.
 - 3. Finish shall be clean and ready for the application of any additional finishes.
- B. Perform periodic and final cleaning as specified in Specification Section PROJECT CLOSEOUT.
 - 1. Clean Owner-occupied areas daily.
 - 2. Clean spillage, over spray, and heavy collection of dust in Owner-occupied areas immediately.
- C. At completion of work of each trade, clean area and make surfaces ready for work of successive trades.
- D. At completion of alteration work in each area, provide final cleaning and return space to a condition suitable for use by the Owner.
- E. Contractor shall remove all materials and items as indicated on drawings or otherwise required. Remove all trash or debris as it accumulates and legally dispose of it off site at no additional cost to the Owner.

3.4 PROTECTION

- A. Protection from weather:
 - 1. Protect newly installed work from freezing for 24 hours after erection, installation or application.
- B. Protection from traffic:
 - 1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.
 - 2. Immediately after cleaning, neatly apply four (4) mil thick, minimum, polyethylene film over finished surfaces at traffic areas. Fasten film firmly to surfaces without visually marring those surfaces.
- C. Assign the work of moving, removal, cutting and patching, to trades qualified to perform the work in a manner to minimize the possibility of damage to each type of work, and provide means of returning surfaces to appearance of new work.
- D. Perform cutting and removal work with minimal disruption and manner to avoid damage to adjacent work.
- E. Cut finish surfaces such as masonry, tile, plaster or metals, by methods which terminate surfaces in a straight line at a natural point of division.
- F. Perform cutting and patching as specified in Specification Section CUTTING AND PATCHING.

ALTERATION PROJECT PROCEDURES

- G. Protect existing finishes, equipment, and adjacent construction from damage.
 - 1. Protect existing and new work from weather and extremes of temperature.
 - 2. Maintain existing interior work above 60 degrees F.
 - 3. Provide weather protection, waterproofing, heat and humidity control as needed to prevent damage to remaining work and to new work.

3.5 SCHEDULES

A. Schedule work in the sequences specified in Specification Section - SUMMARY OF WORK, if applicable.

END OF SECTION

REGULATORY REQUIREMENTS

SECTION 014100 – REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - 2. Section 4-317 (c), Part 1, Title 24, CCR, requires the following:
 - a. "The intent of these drawings and specifications is that the work of the alteration, rehabilitation or reconstruction is to be in accordance with Title 24, California Code of Regulations. Should any existing conditions such as deterioration of non-complying construction be discovered which is not covered by 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."
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

- A. References to standards, codes, specifications, recommendations and regulations, refer to the latest edition or printing in effect at the date of issue shown in the Documents unless another date is implied by the suffix number of the Standards.
- B. Applicable portions of the Standards listed that are not in conflict with the Contract Documents shall be construed as specification for this work.
- C. General Standards:
 - AFPA American Forest and Paper Association
 ANSI American National Standards Institute
 ASTM American Society for Testing and Materials
 - 4. CAL/OSHA California Occupational Safety and Health Administration
 - a. State of California Construction Safety Orders
 - 5. CS Commercial Standards of the US Department of Commerce
 - 6. EPA Environmental Protection Agency
 - 7. FMG Factory Mutual Group
 - 8. NIBS National Institute of Building Sciences
 - 9. NIST National Institute of Standards and Technology
 - 10. NFPA National Fire Protection Association
 - 11. OSHA Occupational Safety and Health Administration

REGULATORY REQUIREMENTS

- a. Federal Construction Safety Orders
- 12. PS Product Standards of the US Department of Commerce
- 13. SS-CDOT "Standard Specification":
 - a. State of California Department of Transportation (CalTrans)
- 14. UL Underwriters Laboratory Incorporated
- 15. WH Warnock Hersey

1.3 SUBMITTALS

- Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
- 2. Quality Assurance/Control Submittals:
 - a. Certificates:
 - 1) Submit three (3) copies of certificates written on the Contractor's Letterhead indicating that the required codes shall be present at the Job Site.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

- 1. All codes, laws, ordinances, rules, regulations, orders and other legal requirements of City, County, State, Federal and other public authorities which bear on performances of Work shall be applicable to Project. Latest editions shall be applicable unless specified otherwise.
- Relationship between Applicable Codes and Contract Documents. The Contract
 Documents have been developed with the intent to conform to the applicable codes.
 Nothing within the Contract Documents shall be construed to permit Work not
 conforming to the applicable codes.

B. Major Governing Codes And Regulations:

- 1. General: All work shall comply with the requirements of the following codes and regulations. Special reference in other Sections of the Specifications to a specific code will be by use of the abbreviation given in front of the Code.
 - a. Freestanding equipment (if applicable) shall be provided and installed in accordance with the seismic requirements where the Project is located.
- 2. NOTE: * -Indicates that a copy of these codes shall be at the job site at all times.
- 3. AUTHORITY HAVING JURISDICTION:
 - a. AHJ: Authority Having Jurisdiction
- 4. FEDERAL LAW:
 - a. ADA: Americans with Disabilities Act
- 5. CALIFORNIA CODE OF REGULATIONS (Previously known as the California Administrative Codes)
 - a. CCR-T5: California Code of Regulations, Title 5-Education.
 - b. CCR-T8: California Code of Regulations, Title 8-Industrial Safety
 - 1) Contains the California Elevator Safety Code.
 - c. CCR-T19: California Code of Regulations, Title 19-Public Safety.
 - d. CCR-T21: California Code of Regulations, Title 21-Public Works.
 - e. *CCR-T24: California Code of Regulations, Title 24, Part 1-Administrative Regulations.
- 6. CALIFORNIA BUILDING, ELECTRICAL, MECHANICAL, PLUMBING, ENERGY, FIRE, and REFERENCED CODES
 - a. *CBC: California Building Code 2019 California Code of Regulations, Title 24-Part 2, Volumes 1 and 2, CCR-T24, based on the 2018 edition of the IBC (International Building Code), with the latest California State Amendments.

REGULATORY REQUIREMENTS

- b. *CEC: California Electrical Code 2019, California Code of Regulations, Title 24-Part 3, CCR-T24, based on the 2017 edition of the NEC (National Electrical Code), with the latest California State Amendments.
- c. *CMC: California Mechanical Code 2019, California Code of Regulations, Title 24, Part 4, CCR-T24, based on the 2018 edition of the UMC (Uniform Mechanical Code), with the latest California State Amendments.
- d. *CPC: California Plumbing Code 2019, California Code of Regulations, Title 24, Part 5, CCR-T24, based on the 2018 edition of the UPC (Uniform Plumbing Code) by IAPMO, with the latest California State Amendments.
- e. *CEnC: California Energy Code 2019, California Code of Regulations, Title 24, Part 6, CCR-T24, and the latest California State Amendments.
- f. *CFC: California Fire Code 2019, California Code of Regulations, Title 24, Part 9, CCR-T24, based on the 2018 edition of the IFC (International Fire Code), with the latest California State Amendments.
 - 1) In addition to all other Chapters in the CFC to be followed, attention is specifically called out to comply with Chapter 33 "Fire Safety During Construction and Demolition".
- g. CBSC: California Building Standards Commission, California Code of Regulations, Title 24, Part 10, CCR-T24.
- h. CGBSC: California Green Building Standards Code 2019, California Code of Regulations, Title 24-Part 11, CCR-T24 (CALGreen).
- i. CRSC: California Referenced Standard Code 2019, Title 24, Part 12, CCR-T24, with the latest California State Amendments.
- 7. DSA: DIVISION OF THE STATE ARCHITECT:
 - a. DSA: Regulations of the Division of the State Architect of the State of California:
 - 1) ACS: Access Compliance Section
 - 2) SSS: Structural Safety Section
 - 3) FLS: Fire and Life Safety Section
 - 4) IR: Interpretation of Regulations.
- 8. DEPARTMENT OF HEALTH CARE ACCESS AND INFORMATION.
 - a. HCAI: Regulations of the "Department of Health Care Access and Information" of the State of California.
- 9. OTHER STATE AGENCIES:
 - a. AQMCD: Air Quality Management Control District in the area where the project is located.
 - b. RWQCB: Regional Water Quality Control Board in the area where the project is located.
- C. Governing Authority:
 - 1. DSA: Division of the State Architect.
 - a. The provisions of the State of California, Statutes of 1933, Chapter 59, Safety of Construction of Public School Buildings Act, and the latest regulation based thereon, of the Division of the State Architect of the State of California, shall be the governing authority and shall take precedence over other applicable codes.
 - b. The following shall be stamped and signed by the A/E on Record or Delegated Design Professional per CBC, Part 1, Section 4-317 (h), and the following:
 - 1) Addenda or Bulletins per Sec. 4-338(b): All addenda or bulletins shall be signed and approved by the Division of State Architect.
 - 2) Construction Changes per Sec. 4-338(c): All Construction Changes related to structural items, fire safety issues, life safety issues and accessibility compliance issues shall be reviewed and approved by the appropriate Division of the State Architect.

REGULATORY REQUIREMENTS

- 3) Substitutions (per DSA) shall be treated like Addenda, or Construction Changes per Sec. 4-338(c), and IR A-6: All substitution requests and substitutions related to structural items, fire safety issues, life safety issues and accessibility compliance issues shall be reviewed and approved by the appropriate Division of the State Architect prior to fabrication and installation.
- 2. HCAI: Department of Health Care Access and Information.
- 3. AHJ: Authority Having Jurisdiction.
 - a. This Project will be under the authority of:
 - 1) The City of Fresno Codes and Standards.
 - 2) The County of Fresno Codes and Standards.
 - 3) --Other--

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - a. The abbreviations, symbols and work meanings not defined in the Contract
 Documents are in accordance with building industry usage and convention.
 Questions which arise as to "meaning," or intent shall be referred to the Architect
 prior to bidding for interpretation.
 - b. Refer to drawings for additional abbreviations and symbols.
 - c. Refer to GENERAL and SPECIAL or SUPPLEMENTAL CONDITIONS and specific specification Sections for additional definitions.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 DEFINITIONS

- A. EXECUTE Perform what is required to install, apply, erect and otherwise incorporate products in to this Project.
- B. FURNISH Supply products required, deliver to Project, unload, store and install as required in location as directed by Contractor, Owner or Architect.
- C. GUARANTEE An assurance by the seller or installer that products or Work are as represented or will be as promised in compliance with Specifications. Synonymous and interchangeable with WARRANTY.
- D. INSTALL Incorporate into this Project.
- E. PRODUCTS The material, equipment, fixtures and other physical substances required to execute the Project.
- F. PROVIDE Furnish and Install into this Project.
- G. WARRANTY An assurance by the seller or installer that products or Work are as represented or will be as promised in compliance with Specifications. Synonymous and interchangeable with GUARANTEE.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

TESTING AND INSPECTION SERVICES

SECTION 014523 – TESTING AND INSPECTION SERVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - One Project Inspector (Owner's Inspector), including Special and/or Assistant
 Inspector(s) (minimum Class 1 Rating), as required, will be employed by the Owner in
 accordance with the requirements of CCR-Title 24, Part 1, CALIFORNIA
 ADMINISTRATIVE CODE, and the latest amendments, and will be assigned to the
 Project.
 - a. Duties of a Project Inspector are specifically defined in CCR-Title 24, Part 1, and the latest amendments.
 - b. Special Inspections (not within the Project Inspector's abilities) shall be performed by the Testing Laboratory or other Special Inspector as approved by the Owner and DSA.
 - 1) All Special Inspections shall be approved by DSA in accordance with CCR-T24, Part 1, Chapter 4, Group 1, Article 5, Section 4-335.1.
 - 2. The Project Inspector shall be employed by the Owner and approved by the Architect, Structural Engineer, and DSA.
 - a. See the Title Page of this Project Manual for the name of this Project.
 - b. Payment of the Project Inspector will be by the Owner.
 - 3. Provide all access, facilities and information required by the Project Inspector for the Project.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 DEFINITIONS

- A. Responsibilities of the Project Inspector:
 - 1. The Project Inspector will be required to provide inspection of the Work (including "Continuous Inspection") as required in CCR-T24, Part 1:
 - a. Educational Work: Chapter 4, Group 1, Article 6, 4-342 (b).
 - 2. The Project Inspector will report to the Owner, the Architect and DSA as required during the progress of the Work.
 - 3. The Project Inspector shall review all Pay Requests prior to submittal to the Architect.
- B. Responsibilities of the Contractor:
 - 1. Written Statement of Responsibility to the Owner and the Authority Having Jurisdiction (DSA) per CBC Chapter 17A:

TESTING AND INSPECTION SERVICES

- a. Provide a written Statement of Responsibility regarding the Contractor's understanding of the special inspection requirements and identifying individuals in their firm responsible for exercising control over the conformance to the construction documents.
- 2. Provide the Project Inspector free access to any and all parts of the Project at all times.
- 3. Provide the Project Inspector information necessary to keep him fully informed with respect to the progress, manner and character of Work.
- 4. Perform no Work in absence of the Project Inspector unless alternate arrangements have been made in advance and agreed to by the Owner, the Architect and DSA.
- 5. The Owner's "Inspection of Work" by the Project Inspector shall not relieve the Contractor from any conditions of this Contract.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Quality Assurance/Control Submittals:
 - a. Written Statement of Responsibility to the Owner and the Authority Having Jurisdiction per CBC Chapter 17A.
 - b. Project Inspector's Field Reports:
 - 1) Submit four (4) copies of reports.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. In accordance with Specification Section REGULATORY REQUIREMENTS.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

NOT APPLICABLE

TESTING LABORATORY SERVICES

SECTION 014529 – TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. The Owner's Testing Laboratory shall be employed by the Owner and approved by the Architect, Structural Engineer, and DSA.
 - a. Payment of the Owner's Testing Laboratory will be by the Owner.
 - b. The Owner shall pay for all initial testing indicated as paid for by Owner except as specified otherwise or in the schedule at the end of this section.
 - 1) Cost of re-testing (due to initial failures) shall be back-charged to the Contractor, and those excess costs will be deducted from the Contract Price.
 - 2) Cost of testing (due to shop fabrication or in-plant testing out of state and beyond a 75 mile radius of the Project Site) shall be back-charged to the Contractor, and those excess costs will be deducted from the Contract Price.
 - 2. Provide all access, facilities and information required for the testing of the various portions of the Work as required by Regulatory Agencies, Planning, Agencies, Building Agencies, and other Governmental Inspectors, the Contract Documents and the Owner.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 DEFINITIONS

- A. Responsibility of the Testing Laboratory:
 - 1. Taking all specimens.
 - 2. Performing Tests.
 - a. The Testing Laboratory's duties shall include all tests required by the DSA 103 Form prepared at the time of DSA Approvals, and any other testing as determined by authorities or the Project Inspector during the course of the work.
 - b. Special Inspections (not within the Project Inspector's abilities) shall be performed by the Testing Laboratory or other Special Inspector as approved by the Owner and DSA.
 - 1) All Special Inspections shall be approved by DSA in accordance with CCR-T24, Part 1, Chapter 4, Group 1, Article 5, Section 4-335.
 - 3. Writing Test Reports
 - 4. Review of "Continuous Inspection" reports by the Project Inspector.
 - a. Portions of the Work requiring "Continuous Inspection" shall be performed by the Project Inspector (if qualified) and all reports will be reviewed by the Testing Laboratory.
 - 5. Distribute Test Reports to the Owner, Architect, applicable Engineer, Contractor and to DSA.

TESTING LABORATORY SERVICES

- B. Responsibilities of the Contractor:
 - 1. Contractor shall provide a Testing Schedule that is in accordance with the following:
 - a. Format of the Testing Schedule shall be in accordance with Specification Section CONSTRUCTION SCHEDULES.
 - b. Cooperates with the Testing Laboratory's schedule of required testing.
 - c. Contractor shall coordinate Construction Schedule and Testing Schedule.
 - 1) Format of testing schedule in accordance with Specification Section CONSTRUCTION SCHEDULES.
 - 2. Cooperation with testing laboratory:
 - a. Provide access to Work being tested.
 - b. Provide test samples as selected by testing laboratory.
 - c. Schedule Work so that there shall be no excessive inspection time.
 - 1) At times that an inspector is required, sufficient work shall be laid out and adequate personnel supplied so that the inspector's time shall be used to full advantage.
 - 2) If inspection costs become excessive because of poor shop or construction procedure, such excess costs will be paid for by the Owner, but deducted from the Contract Price.
 - d. Inspections and tests required by regulatory agencies shall be the responsibility of and shall be paid for by the Owner unless specified otherwise.
 - e. Inspections and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.
 - f. Test Reports:
 - 1) Distribute test reports and related instruction to insure all required re-testing and/or replacement of materials.
 - g. Payment of Testing:
 - 1) All testing shall be paid for by the Owner.
 - 3. Contractor shall be backcharged for re-testing, excessive distance from the Project Site, or extra testing required because of initial failures.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Quality Assurance/Control Submittals:
 - a. Test Reports:
 - 1) Submit four (4) copies of testing laboratory's report.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Testing Laboratory Qualifications:
 - a. In accordance with the latest Edition of ASTM E-329.
- B. Regulatory Requirements and Reference Standards:
 - 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. In accordance with regulatory agencies and appropriate ASTM Standards.

TESTING LABORATORY SERVICES

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULES

A. Testing Schedule at the end of this section should be used as a guide only and it is not considered a complete list. Refer to regulatory agency requirements and specific specification section for complete testing requirements.

B. TESTING SCHEDULE

- 03 15 14 DRILLED ANCHORS
 - a. Tension Tests.
 - 1) Paid by Owner.
- 2. 03 20 00 REINFORCEMENT
 - a. Rebar Material per ACI 318, CBC TABLE 1705A.2.1, CBC Sections 1903A.1, 1905A. and 1910A.
 - 1) Paid by Owner
 - b. Continuous Inspection of Welds per ACI 318, CBC TABLE 1705A.2.1, CBC Sections 1903A.8, 1905A, and 1910A.
 - 1) Paid by Owner
- 3. 03 30 00 CAST-IN-PLACE CONCRETE
 - a. Cement Material per ACI 318, and CBC Sections 1903A, 1905A, and 1910A.
 - 1) Paid by Owner
 - b. Aggregate Material per ACI 318.
 - 1) Paid by Owner
 - c. Concrete Mix per ACI 318. CBC Sections 1903A and 1910A.
 - 1) Paid by Owner
 - d. Concrete Strength Tests per ACI 318.
 - 1) Paid by Owner
 - e. Concrete Compression Tests per ACI 318.
 - 1) Paid by Owner
- 4. 05 12 00 STEEL AND FABRICATIONS
 - a. Steel Material per CBC Section 1705A.2.
 - 1) Paid by Owner
 - b. High Strength Bolts and installation per CBC Section 1705A, and CBC Section 1705A.2.6.
 - 1) Paid by Owner
 - c. Inspection of Shop and Field Welding per CBC Section 1705A, and CBC Section 1705A.2.5.
 - 1) Paid by Owner
- 5. 09 51 00 ACOUSTICAL CEILINGS
 - a. Main and cross runners, intersection connectors and expansion devices
 - 1) Paid by Contractor
- 6. DIV. 22 PLUMBING
 - a. Non-Leaking System
 - 1) Paid by Contractor
 - b. Bacteriological Purity

TESTING LABORATORY SERVICES

- 1) Paid by Contractor
- 7. DIV. 23 HEATING, VENTILATING AND AIR CONDITIONING
 - a. Equipment Operation
 - 1) Paid by Contractor
 - b. System Energy Balance
 - 1) Paid by Contractor
 - c. Non-Leaking Hydronic System.
 - 1) Paid by Contractor
- 8. DIV. 26 SERVICE AND DISTRIBUTION
 - a. Equipment Operation
 - 1) Paid by Contractor
 - b. Protective Systems
 - 1) Paid by Contractor
- 9. DIV. 26 LIGHTING
 - a. Equipment Operation
 - 1) Paid by Contractor
- 10. DIV. 27 MASTER CLOCK AND PUBLIC ADDRESS SYSTEM
 - a. Equipment Operation
 - 1) Paid by Contractor
- 11. DIV. 28 FIRE SPRINKLER SYSTEM
 - a. All tests required by NFPA #13.
 - 1) Paid by Contractor
- 12. DIV. 28 WET CHEMICAL FIRE SUPPRESSION SYSTEM
 - a. All tests required by NFPA #17A.
 - 1) Paid by Contractor
- C. Division of the State Architect "Statement of Structural Tests and Special "Inspections":
 - 1. In addition to the TESTING SCHEDULE cited above, and elsewhere within the documents, DSA requires the Contractor to schedule and manage the following tests to be performed and reported as required for this Project.
 - 2. Failure to schedule these tests is grounds for reduction in Monthly Payment Request authorization, and may delay distribution of the Final Payment.
 - 3. Refer to the approved DSA 103-Listing of Structural Tests and Special Inspections Form.

SECTION 015000 – TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Temporary Utilities, Support Facilities, and Protection Facilities materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Shop Drawings:
 - a. Project Sign.
 - 2. Quality Assurance/Control Submittal:
 - a. Copy of Application to APCD for Dust Prevention and Control Plan.
 - b. Copy of approved Application to APCD for Dust Prevention and Control Plan.
 - c. Copy of Application to local City or County Engineer for Traffic Control.
 - d. Copy of approved Application to local City or County Engineer for Traffic Control.
 - e. Temporary Project Enclosure Plan.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. CAL/OSHA California Division of Occupational Safety and Health Administration
 - c. CF County of Fresno, Codes and Ordinances
 - d. EPA Environmental Protection Agency
- B. Dust Prevention and Control Plan:

- 1. Prior to commencing the Work, prepare a Dust Prevention and Control Plan and obtain review and approval of the Air Pollution Control District (APCD) in the area where the project is located.
 - a. Prepare application and file with appropriate fees to APCD upon completion of Dust Prevention and Control Plan.
- The Dust Prevention and Control Plan shall specify the methods of control that will be utilized, demonstrate the availability of needed equipment and personnel, and identify a responsible individual who, if needed, can authorize implementation of additional measures.
- 3. All construction shall comply with applicable elements of the APCD's regulations.

C. Temporary Project Enclosure Plan:

- 1. Prior to commencing the Work, prepare a Temporary Project Enclosure Plan indicating the protection of people, animals, and partial and fully completed work until occupancy by the Owner.
- 2. Identify temporary egress from existing occupied facilities and as required by authorities having jurisdiction.
- 3. The Temporary Project Enclosure Plan shall include, but not be limited to, the following:
 - a. Contractor's name and project identification information.
 - b. Indicate the duration of the proposed measures based on the completion of the work as a whole and if any phases of work are identified.
 - c. Indicate proposed temporary fencing and potential exit and entry paths.
 - 1) Show gate and door locations and indicate who has access.
 - d. Indicate proposed temporary wall location(s) and potential exit and entry paths.
 - 1) Show door location(s) and indicate who has access.
 - e. Indicate type of material used for temporary fencing, walls, gates, and doors.
 - f. Indicate proposed temporary offices and storage areas.

D. Copy of approved Fire Protection Program:

- 1. Contractor shall be responsible for the development, implementation, and maintenance of a written plan establishing a fire prevention program at the project site applicable throughout all phases of the construction, repair, alteration, or demolition work in accordance with CFC Chapter 33, Section 3308 and sub-sections.
- 2. It is the Contractor's responsibility to contact local Fire Authority to discuss the plan.
 - a. A copy of the report should be made available to the Project Inspector and local Fire Authority.
- 3. Approval Required: Prior to commencing the Work, prepare a Fire Protection Program and obtain review and approval from the local Fire Authority in the area where the project is located.
- 4. Plan shall address at a minimum:
 - a. Each phase of the construction, repair, alteration, or demolition work.
 - b. Designate responsible program superintendent in accordance with CFC 3308.2.
 - c. Duties of staff.
 - d. Staff training requirements.
 - e. Prefire plans.
 - f. Fire protection devices.
 - g. Hot work operations.
 - h. Impairment of fire protection systems.
 - i. Temporary covering of fire protection devices.

1.4 PROJECT CONDITIONS

A. Environmental Requirements:

1. Heating and Cooling:

- a. Provide temporary heating and cooling required by construction activities for curing, acclimating the building or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed, and is maintained prior, during and after the installation in accordance with the exterior or interior building materials temperature and humidity guidelines.
 - 1) Do not use heating units that contribute moisture to the enclosed spaces under construction.

2. Ventilation and Humidity Control:

- a. Provide temporary ventilation required by construction activities for curing, acclimating the building or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 - 1) Exterior Moisture Control:
 - a) Perform the installation of all exterior building cladding only after the substrate to which they are being applied is dry and ready to receive them. Do not apply any cladding if it will trap moisture inside a wall or roof cavity (i.e. insulation that has become wet for whatever reasons).

2) Interior Moisture Control:

- a) Perform the installation of all interior moisture sensitive building materials only after the building or space is acclimated to the final environmental conditions under which the building is to be operated in accordance within the Owner's humidity control guidelines.
- b. Maintain a consistent humidity in accordance with the guidelines for those materials in the space at least seven (7) days prior to installation of any moisture sensitive materials (i.e. Veneer Plaster, Gypsum Board, Ceiling Tiles, Wood Sensitive Floors, other Flooring sensitive to moisture levels, Interior Painting, etc.).
- c. Maintain the same levels or temperature and humidity during the installation of those materials, and after the installation of those materials until the building's own mechanical systems can be turned on to maintain the facility within the Owner's temperature and humidity control guidelines.
- d. Replace any materials that have become wet and damaged due to the Contractor not properly protecting installed building materials at no additional cost to the Owner.

3. Dust control:

- a. Perform work in a manner as to minimize the spread of dust and flying particles.
- b. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.
- 4. Burning: No burning will be allowed on-site.
- 5. Noise Control:
 - a. Stationary noise sources shall be of a low-noise emission design, consistent with the best available noise reduction technology.
 - b. The hours of operation of noise-generating equipment shall be restricted to 6:00 a.m. to 7:00 p.m. Monday through Friday, and to 8:00 a.m. to 6:00 p.m. on Saturday and Sunday.
 - c. Mufflers shall be required on all gas and diesel-powered equipment.

B. Existing Conditions:

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

2. Cultural Resources:

- a. The Contractor is advised of the possibility that cultural resources may be discovered during project activities.
- b. If any cultural or paleontological materials are uncovered during project activities, work in the area or any area reasonably suspected to overlie adjacent remains shall be stopped and the Architect advised of the discovery. The Architect will notify the appropriate agency and the work shall remain stopped until professional cultural resources evaluation and/or data recovery excavation can be planned and implemented. Appropriate measures to protect remains from accidents, looting, and vandalism shall be implemented immediately on discovery.
- c. If human remains are discovered, the work in the area or any area reasonably suspected to overlie adjacent remains shall be stopped and the County Coroner and the Architect shall be notified immediately. Appropriate measures to protect remains from accidents, looting, and vandalism shall be implemented immediately on discovery. The work shall remain stopped until professional cultural resources evaluation and/or recovery excavation can be planned and implemented.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Fire Protection During Construction:

1. Provide Temporary Fire Protection per CFC Chapter 33 during demolition and construction.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

- 1. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
- 2. Execution of work under this specification section shall constitute acceptance of existing conditions.
- 3. Obtain all necessary permits and authorizations by regulatory agencies required to perform the work under this section.

3.2 PREPARATION

A. Coordination:

- 1. Before proceeding, verify plans match existing conditions.
- 2. Coordinate work under this specification with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:

- 1. The Contractor shall verify and protect existing landscaping, asphalt area, concrete walkways, and other site improvements to remain on the site before proceeding with the Work
- 2. Prior to starting Work, hose bibbs, utility lines, etc., to be abandoned and removed within the construction area shall be stubbed off outside the limits of construction.
- 3. Verify and protect utilities to remain within the construction area and provide special construction for their protection.

3.3 IMPLEMENTATION

A. General:

- 1. Perform Work and provide and maintain Temporary Utilities and Temporary Facilities in accordance with the requirements of all regulatory authorities having jurisdiction.
- 2. Contractors shall cooperate with other contractors and the Owner in the use of the site, Temporary Utilities, Temporary Facilities and shall adjust their operations to maintain harmonious relations and uninterrupted progress of the Work.
- 3. The Contractor shall assume all responsibility for the provision and maintenance of these Temporary Utilities and Temporary Facilities and for the provisions of public safety where the operations under this Contract interface with public areas.
- 4. Relocate and modify Temporary Utilities and Temporary Facilities, as required by progress of the Work.
- 5. Remove Temporary Utilities and Temporary Facilities upon completion of the Project.
- 6. Temporary Utilities and Temporary Facilities are to be provided and maintained from commencement of Work until final acceptance.
 - a. The Contractor shall pay all charges required of him for the duration of the project, including a 1 month period following the date of the Notice of Substantial Completion.

B. Temporary Utilities:

- 1. Install temporary service or connect to existing service.
 - a. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
 - 1) Minimum forty-eight (48) hours prior notice to any interruption.
- 2. Sewers:
 - a. Provide temporary service to remove effluent lawfully.
- 3. Storm Drainage:
 - a. Provide temporary service as necessary to remove storm water. Work shall be performed in accordance with the requirements of the Storm Water Pollution Prevention Plan (SWPPP), if any. If no SWPPP is required, then follow local authorities having jurisdiction requirements.
- 4. Water:
 - a. The Owner will pay for all water supply for all purposes of construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.

5. Electrical:

a. The Owner will pay and the Contractor shall provide for all electrical facilities and services for all purposes of power and lighting for construction at a location to be designated at the site. Extensions within the site shall be provided by the Contractor and maintained in a safe and efficient manner.

- 1) The Contractor shall pay for cost of electrical energy required in connection with the testing of such equipment as generators, transformers, power machinery, and similar equipment installed in the work.
- b. The Contractor will provide electrical energy to all subcontractors as required on or about the premises.
- c. The Contractor will provide power outlets having adequate electrical characteristics and lighting of adequate intensity for the use of other contractors within reasonable distances from their needs and within a reasonable period of time after the other contractors have requested them.

6. Telephone:

- a. The Contractor shall provide and pay for all telephone service and telephone equipment in the Field Offices until completion of the Work.
 - 1) Provide an additional dedicated phone line for modem/network connection in the Project Inspector's Field Office for use by the Architect's representative.

7. Heating:

- a. Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity.
- b. Select UL or FM approved equipment that will not have a harmful effect on completed installations or elements being installed.
 - 1) Except where use of the permanent heating system is authorized, provide temporary units that do not introduce moisture into the newly constructed building spaces.
 - 2) Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.
- c. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

C. Temporary Facilities:

- 1. Support Facilities:
 - a. Offices and Storage:
 - 1) Provide temporary offices and storage facilities located within the construction area.
 - 2) Protect materials, construction work and their operations from weather, vandalism, and theft.

b. Sanitary Facilities:

- 1) Provide adequate, self-contained toilets as required for all persons employed on the Project.
- 2) In no case shall the permanent plumbing fixtures of the Project be used for this purpose.

c. Traffic Controls:

- 1) Maintain access for fire-fighting equipment and access to fire hydrants.
- Conduct work and comply with applicable building codes and regulations regarding the use of public streets and sidewalks and the proper barricading and lighting of public thoroughfares surrounding the construction activities.
- 3) Provide and maintain access as required to perform work.
- 4) Repair all damage as a result of work performed on the project to adjacent roads, streets, drives and walks. Restore to condition as good as existed at commencement of the Work.

d. Project Sign:

- 1) Install project sign as submitted and approved.
- 2) No other signs will be allowed on the project.
- 2. Protection Facilities:

a. Existing Facilities:

 Protect existing vegetation, equipment, structures, utilities, and other improvements at project site and on adjacent properties, except those indicated to be removed or altered. Damage occurring during the course of construction shall be repaired to condition at the start of the Work.

b. Environmental:

 Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

c. Project Enclosure:

- 1) Implement procedures and measures outlined in Temporary Project Enclosure Plan.
- 2) Project enclosure shall protect materials, construction work, and operations from vandalism, theft, and to exclude the intrusion of the public into the construction area.
- 3) Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by the Owner from fumes and noise.
- 4) Maintain security by limiting number of keys and restricting distribution to authorized personnel.

3.4 CLEANING

- A. Clean in accordance with Specification Section PROJECT CLOSEOUT.
 - 1. At all times, keep the premises free from accumulations of waste materials or rubbish caused by employees or the Work.
 - 2. Clean all soiled surfaces to remain immediately.
 - 3. At the completion of the Work, remove all rubbish from and about the building and all tools, scaffolding, and surplus materials and shall leave the Work "broom clean" or its equivalent.

INTENTIONALLY LEFT BLANK

SECTION 016400 – OWNER-FURNISHED ITEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all materials, labor, equipment, and services necessary to prepare for installation for those items, noted or scheduled within the Contract Documents, indicated as follows:
 - a. CFCI Contractor Furnished, Contractor Installed
 - b. OFCI Owner Furnished, Contractor Installed
 - c. OFOI Owner Furnished, Owner Installed
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 DEFINITIONS

- A. Unless otherwise defined in the GENERAL CONDITIONS, the following definitions apply for this project:
 - 1. CFCI: CONTRACTOR FURNISHED, CONTRACTOR INSTALLED
 - a. When and if the indication "CFCI" is noted on the drawings or listed in the specifications, such items are shown or listed for information and will be furnished by and installed by the Contractor. Such a designation is listed only for clarity, in order to set the item(s) apart from the OFCI, OFOI, and OFVI related item(s).
 - b. All item(s) shown or listed in the drawings and specifications without any indication are in the Contract and are part of the Work unless specifically noted otherwise.
 - 2. OFCI: OWNER FURNISHED, CONTRACTOR INSTALLED
 - a. When and if the indication "OFCI" is noted on the drawings or listed in the specifications, such item(s) are shown or listed for information and will be furnished by Owner and installed by the Contractor. The Contractor shall coordinate and verify all dimensions and details necessary for the proper installation.
 - 3. OFOI: OWNER FURNISHED, OWNER INSTALLED
 - a. When and if the indication "OFOI" is noted on the drawings or listed in the specifications, such item(s) are shown or listed for the purpose of general information and will be furnished and installed by Owner. The Contractor shall coordinate and verify all dimensions and details necessary for proper installation.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Coordination Drawings:

- a. Submit installer's coordination drawings or other documents indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
- b. The Owner will provide Product Data, Shop Drawings, Piping and Wiring Diagrams, Catalog Data Sheets for any items provided under this Specification Section.
- 2. Closeout Submittals in accordance with Specification Sections in Division One:
 - a. Project Record Documents in accordance with Specification Section PROJECT DOCUMENTS.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

- 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA). Regulatory changes may affect the formulation, availability, or use of the specified coatings. Confirm availability of coatings to be used prior to use, and notify the Architect of any recent changes in the Local California Air District Standards where the Project is located, that may have occurred after the preparation of this specification section.

B. Meetings:

- 1. Progress Meetings: Scheduled by the Contractor for the proper performance of the work.
 - a. Minimum agenda shall be to review the work progress; discuss field observations, problems, and decisions; identification of any potential problems which may impede planned progress; corrective measures to regain projected schedules; and maintenance of quality and work standards in accordance with manufacturer's warranty requirements.
- 2. Final Inspection: Scheduled by the Contractor upon proper completion of the work.
 - a. Minimum agenda shall be a walkover inspection to identify problems which may impede the issuance of any warranties or guarantees, and discussion of maintaining the work until substantial completion notice for the project is filed.
- 3. Participants (or designated representative of) invited to attend each of the above meetings shall be as follows:
 - a. Contractor.
 - b. Owner.
 - c. Architect.
 - d. Installer.
 - e. Material Manufacturer(s).
 - f. Subcontractors, as appropriate (including any accessory subcontractors).

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 - Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage. Damaged products will not be accepted. Contractor shall inspect prior to unloading, for any damaged goods, and if OK, will allow unloading and be responsible for the goods.

B. Acceptance at Site:

1. The Contractor shall accept delivery of any items and the responsibility for all items to be furnished to him by the Owner.

C. Storage and protection:

- 1. Owner Furnished Equipment: The Owner will coordinate and inform the Contractor as to delivery dates for Owner Furnished Equipment to the Project Site. The Contractor shall be responsible for unloading, uncrating, and protecting such equipment.
- 2. When only a supporting device, or sub-assembly is to be installed by the Contractor the Owner shall provide only that portion and shall store and safeguard those portions to be installed later by others.
- 3. All products shall be protected, handled, and stored in complete compliance with the manufacturer's printed instructions to protect the Owner from warranty infringements or loss of the full function of the item specified.

1.6 PROJECT CONDITIONS OR SITE CONDITIONS

A. Existing Conditions:

- 1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
- 2. Examine all preparatory work to determine its suitability and completeness. Notify the responsible Contractor of any deficiencies which must be corrected prior to installation.
- 3. Be satisfied that all conditions affecting installation, operation or function are suitable for installation of the items scheduled.
- 4. After installation, and acceptance by the inspector and the Architect, the Contractor shall provide protective guards, covers or barricades as required by the manufacturer.
- 5. The Contractor shall promptly repair, refurbish, or replace items damaged by his operations to a condition satisfactory to the Owners representatives and at no cost to the Owner.

1.7 WARRANTY

- 1. The Contractor shall provide access to the installed items or prepared substrates for the inspection of the manufacturers representatives, for the purpose of affirming the warranties scheduled.
- 2. All work shall be performed in full accordance with the manufacturers warranty requirements and all governing codes.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordination:

- 1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
 - a. Prepare all substrate blocking as required by the items Furnished By Owner.
 - b. Prepare all wiring and piping connections as required by the items Furnished By Owner.

B. Protection:

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

C. Surface preparation:

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

3.2 INSTALLATION

A. General:

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

B. Layout:

1. Lines shall be straight and true.

C. Material and Equipment to be installed:

1. All items so noted or scheduled to be OFCI shall be unloaded, completely installed and placed in operable condition under this Contract.

3.3 CLEANING

- A. Clean in accordance with Specification Section PROJECT CLOSEOUT.
 - 1. Clean any soiled surfaces at the end of each day, minimum.
 - 2. In accordance with manufacturer's instructions and recommendations.

3.4 SCHEDULES

- A. This schedule is provided for the convenience of the General Contractor for items not scheduled elsewhere on the drawings or in the Specification Sections. Refer to Drawings for additional items not listed below:
 - 1. Roofing.
 - 2. Food Service Equipment.

SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary for cutting and patching existing materials, accessories and other related items necessary to remodel the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of Work.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Coordination Drawings:
 - a. Submit any installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.

1.4 OUALITY ASSURANCE

- A. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades.
 - 1. Review areas of potential interference and conflict.
 - 2. Coordinate procedures and resolve potential conflicts before proceeding.
- B. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- C. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- E. The Contractor shall do all cutting, fitting or patching of existing construction and his work as may be required to make the several parts come together properly and ready to receive or be received by work of other contractors as shown, or reasonably implied by the drawings and specifications for the completed structure. All work shall be as directed by the Architect to achieve the intended work and degree of finish shown.
- F. Any cost caused by defective or ill-timed work shall be borne by the party responsible therefor.

1.5 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas.

3.3 FIELD QUALITY CONTROL

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill. Do not overcut concrete corners hand chip all corners to prevent over-cutting lines. Cut any masonry pavers at grout lines, and don't overcut into adjacent brick that is to remain.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- C. Grinding and Sandblasting: Where grinding and sandblasting is required of existing construction, perform in accordance with industry standards for proper preparation of new construction or finishes.
- D. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - a. All hard paving and walk replacement shall be flush with adjacent existing construction. Compact existing subgrade so that there is no settling of adjacent horizontal surfaces greater than 1/4", and that all surfaces are ADA compliant.

- b. When altering surfaces in brick paving, match nearby adjacent horizontal concrete surfaces in color and texture. Take care to protect adjacent brick surfaces from concrete slurry and finishing operations. Clean exposed surfaces of brick immediately so that no signs of adjacent concrete work is seen.
- c. Match existing adjacent exposed aggregate concrete paving (color and texture) when construction is proposed for areas paved with exposed aggregate concrete.
- d. Match existing adjacent colored concrete paving (color and texture) when construction is proposed for areas paved with colored concrete.
- 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
- 4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
- 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

SECTION 017720 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

C. Work Included:

- 1. Project cleanup and coordination of all cleaning work required under all sections of this specification.
- 2. Collection of and processing for delivery to the Architect of all Project Record Drawings required under this and other various Sections of the Specifications.
- 3. Compile and assemble all required documents, operation data, maintenance manuals, and parts lists for all equipment items provided for this project.
- 4. Start-up of all mechanical, electrical, and miscellaneous equipment items; and adjustment required for the performance specified.
- 5. Compile and assemble all guarantees, warranties, or other written documentation to establish the requirements outlined under all sections of this specification.
- 6. Repair and touch-up on all items damaged during the construction and handling processes.
- 7. Furnish maintenance material and spare parts as specified within DIVISIONS 02 through 49 of these specifications.
- 8. Deliver to the Architect all assembled copies of those items required in Articles 1 through 6 above for presentation to the Owner.
- D. It shall be the responsibility of the Contractor to provide all labor and materials necessary to achieve completion of the items listed under Paragraph A, B and C above, although certain items may be specified under the work of other trades. Periodic removal of debris, cleaning, repair, and testing of times in various areas of the construction site shall be carried out under the direction of the Contractor.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Quality Assurance/Control Submittals:
 - a. Design Data.
 - 1) All design data as required by the Contract Documents.
 - b. Test Reports:
 - 1) Submit four (4) copies of reports.

- 2) Submit four (4) copies of reports required by regulatory requirements.
- 3) Submit four (4) copies of ICC Evaluation Service Report.
- 4) Submit four (4) copies of Testing Laboratory's report.
- 5) All other Test Reports as required by the Contract Documents.
- c. Certificates:
 - 1) Submit three (3) copies of certificates.
- d. Manufacturer's Instructions:
 - 1) Submit three (3) copies of manufacturer's instructions.
- e. Manufacturer's Field Reports:
 - 1) Submit three (3) copies of manufacturer's field reports.
- f. Engineering Calculations:
 - 1) Submit four (4) copies of engineering calculations computed and signed by a registered Civil or Structural Engineer in the State of California.
- 2. Closeout Submittals in accordance with Specification Sections in Division One:
 - a. Maintenance Data in accordance with Specification Section PROJECT CLOSEOUT.
 - b. Operation Data in accordance with Specification Section PROJECT CLOSEOUT.
 - c. Warranty in accordance with Specification Section WARRANTIES.
- 3. Project Record Documents:
 - a. Various Sections of the detailed specifications require Project Record Drawings to be prepared by the Contractor(s). These drawings shall be collected by the Contractor, checked for conformance to the specific requirements, and when completed, delivered to the Architect. The Contractor shall also be responsible for collecting bound operating and maintenance manuals required of all trades supplying equipment, and for delivering them to the Architect.
- 4. Documents Required for Project Certification
 - a. Compile and neatly assemble with indexed and labeled tabs, three (3) sets of the required documents for project certification by the State Agencies. The required documents include, but are not limited to, the following;
 - 1) Document Required List "Form" for Project Certification ORS-6.
 - a) This document shall be used to organize and index the required documents.
 - 2) Project Information "Forms":
 - a) Project Site Inspector(s) SSS-5.
 - b) Contract Information DSA-102.
 - 3) Final Verified Report "Forms" from the Architect and Engineers:
 - a) Architect's Final Verified Report DSA-6A/E.
 - b) Structural Engineer's Final Verified Report DSA-6A/E.
 - c) Mechanical Engineer's Final Verified Report DSA-6A/E.
 - d) Electrical Engineer's Final Verified Report DSA-6A/E.
 - 4) Final Verified Report "Forms" from the Contractor(s) and Inspector(s):
 - a) Project Site Inspector(s) Final Verified Report DSA-6.
 - b) Contractor(s) Final Verified Report DSA-6.
 - c) In-Plant Inspector(s) Final Verified Report DSA-6.
 - d) Special Inspector(s) Final Verified Report DSA-6.
 - 5) Other Final Verified Reports and Affidavits for:
 - a) Laboratory To be signed by Licensed Professional Engineer.
 - b) Shop Welding and Fabrication To be signed by AWS/CWI Welding Inspector
 - c) Field Welding To be signed by AWS/CWI Welding Inspector
 - d) High Strength Bolt Installation
 - e) Glu-Laminated Fabrication

- f) Manufactured Trusses
- g) Masonry Inspection
- h) Engineered Fill To be signed by the Geotechnical Engineer
- i) Bleacher Fabrication
- j) Other items required by the State Agencies
- 6) Notices, Certificates, and Change Orders
 - a) Notice of Completion Signed by the Owner, Notarized and recorded with the County Recorders Office.
 - b) Weighmaster Certificate(s)
 - c) Fire Alarm System Components
 - d) Fire Standpipe System
 - e) Fire Suppression System
 - f) Change Orders Signed and fully executed.
 - g) Other documents and/or requirements required by the State Agencies
- 7) Field Visit Reports, Correction Reports, Punch Lists & Final Review Reports
 - a) Field Visit Reports from State Agencies
 - b) Field Visit Reports from Architect and Engineers
 - c) Inspector's Correction Reports
 - d) Contractor Punch Lists
 - e) Architect, Engineers and Owner Final Review Reports
 - f) A jointly signed and notarized Affidavit from the Contractor and Project Inspector (formerly the Inspector of Record), indicating that any and all items of correction noted in the above documents have been corrected (including Testing Laboratory Reports).

1.3 QUALITY ASSURANCE:

- A. Safety, Fire and Environmental Protection, and Insurance standards shall be strictly adhered to in all phases of the construction work. It shall be the responsibility of the Contractor to determine the standards applicable to this project as set forth in all codes, regulations, and ordinances having jurisdiction, and as set forth elsewhere in the Specifications.
- B. All specific requirements stipulated in, or required by code references included under all sections of DIVISIONS 02 through 49 inclusive of this specification, and as detailed under Article 3.4 of this Section, shall be required under this Contract.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Materials:
 - 1. Use only those specified materials or types of materials recommended and approved by the manufacturer of the item to be cleaned.
- B. Touch-Up Materials:
 - 1. Use only those materials furnished by or as recommended and approved by the manufacturer of the item to be touched up. Colors and finish characteristics shall exactly match the base material and extra materials, labor, and services required to achieve this result shall be provided by the Contractor(s).
- C. Replacement Materials:

- Materials that are damaged and not repairable, or materials that are destroyed shall be
 replaced with equal and identical materials of the same manufacture and shall function in
 conjunction with the remaining portions of that material. Items no longer manufactured
 or available shall be replaced with comparable materials as approved by the Architect and
 at no additional cost to the Owner.
- 2. Materials that are required for maintenance replacement by the owner after the guarantee period has expired, or by the contractor during the guarantee period shall exactly match those materials installed as to make, style, color lot, etc., under this contract, and shall be delivered to the owner in marked, identified containers.

D. Extra Materials:

1. Carefully examine the requirements of the applicable Sections of all DIVISIONS and specifically of DIVISION 09 and deliver the materials required to the Owner.

PART 3 - EXECUTION

3.1 REPAIR AND RESTORATION

- A. All damaged items shall be repaired and replaced as directed using proper materials and craftsmen skilled in that particular trade. Materials shall be as follows:
 - 1. All repair or replacement parts shall be of the same equality and manufacturer as the item being repaired.
 - 2. All touch-up paint shall be as provided by the item manufacturer for that purpose and shall exactly match the original color and finish.

3.2 FIELD QUALITY CONTROL

A. Final Reviews:

- In addition to all items covered under those Sections of Divisions 02 through 49 inclusive, the Contractor shall comply with the requirements stated herein.
 - a. The Contractor shall request in writing a final review (see Contractor's Request for Final Review form at the end of this Specification Section).
 - 1) The Contractor shall allow a forty-eight (48) hour time period of advance notification prior to the requested date and time indicated on the Review Request form.
 - 2) The Contractor represents that the work has been carefully inspected by the Contractor to determine that the work is complete and in compliance with all requirements set forth.
 - b. The Contractor shall prepare and shall submit the initial Contractor's Punch List identifying the items that remain uncompleted forty-eight (48) hours prior to the scheduled final review by the Architect.
 - c. Under no circumstances shall the Contractor ask the Architect or his representative to make these determinations for him.
- 2. The Architect shall review the initial Contractor's Punch List along with the Owner's Project Inspector, and determine together whether or not the Project is ready for final review. If approved, the Architect or its representative will make the final review on the date and time requested in the Contractor's Request for Final Review form, except under the following conditions:
 - a. Upon reviewing a portion of the Project and finding quantities of work incomplete or not in compliance, the review shall cease, and the Architect will notify the Contractor.

- b. If the Contractor has assured the Architect of the completeness and/or accuracy of the work, and the review does not bear this contention out.
- 3. The above conditions will be adhered to rigidly to prevent the Architect from being required to act as a supervisory agent of the Contractor by being asked to determine the degree of completion,.
 - a. When the Contractor requests additional reviews, he shall reimburse the Architect for all time and expense incurred as indicated on the Contractor's Request for Final Review form at the end of this Specification Section.
 - b. The Architect is herein defined as any of those firms or individuals listed by references on the drawings, including all consultants identified herein.
 - c. All requests for Project Final Review (and re-review) shall be made in writing on the form provided at the end of this Specification Section.
- 4. When the Architect does approve of the degree of readiness for the Project based on the initial Contractor's Punch List and the readiness of the Project, the Architect will make his final review, adding to the Contractor's Punch List any other items that require further completion.
- 5. The Contractor shall take the initial Contractor's Punch List, together with the Architect's Punch List, and initial and date each item on each list as to when it was completed.
- 6. Once both lists are completed and signed by the Project Inspector, the Contractor shall submit to the Architect the completed lists for final review and approval prior to filing for Substantial Completion.

3.3 CLEANING

A. During Construction:

- 1. Oversee cleaning and ensure that building and grounds are maintained free from accumulations of waste materials and rubbish.
- 2. Sprinkle dusty debris with water.
- 3. At reasonable intervals during progress of work, clean up site and access and dispose of waste materials, rubbish, and debris.
- 4. Provide suitable containers and locate on site for collection of waste materials, rubbish, and debris.
- 5. Do not allow waste materials, rubbish and debris to accumulate and become an unsightly or hazardous condition.
- 6. Remove waste materials, rubbish and debris form the site and legally dispose of at public or private dumping areas off the Owner's property.
- Vacuum clean interior building areas when ready to receive finish painting and continue vacuum cleaning on an as-needed basis until building is ready for acceptance or occupancy.
- 8. Lower waste materials in a controlled manner with as few handling as possible; do not drop or throw materials from heights.
- 9. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

B. Final Cleaning:

- 1. Use experienced professional cleaners for final cleaning.
- 2. At completion of construction and just prior to acceptance or occupancy, conduct a final review of exposed interior and exterior surfaces.
- 3. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from interior and exterior surfaces.
- 4. Repair, patch, and touch-up marred surfaces to match adjacent finishes.
- 5. Broom clean paved surfaces; rake clean other surfaces of grounds.
- 6. Replace air conditioning filters if units were operated during construction.

- 7. Clean ducts, blowers, and coils if air conditioning units were operated during construction
- 8. Maintain cleaning until the building, or portion thereof, is accepted by the Owner.

3.4 DEMONSTRATION

- A. During Construction and as each piece of equipment is installed, provide the following tests:
 - 1. Verify that all external service connections have been properly completed, and that piping and/or wiring is properly sized, and contain all necessary safety devices.
 - 2. Verify that the equipment is free of shipping materials, tie downs, or other internal obstructions.
 - 3. Conduct tests employing the manufacturer's operating instructions as a sequential guide.
 - 4. Verify that all portions of the equipment function properly and that the total performance criteria is satisfied.
 - 5. Make adjustments, replacements, or repairs necessary to achieve full operational capability and repeat tests until performance is achieved and approval obtained.
- B. Prior to acceptance, verify that all conditions specified in the Article titled FIELD QUALITY CONTROL, Final Review, have been satisfied and that equipment is ready for continuous use. Provide the following services preparatory to acceptance:
 - 1. Clean or replace all filters and/or strainers.
 - 2. Adjust all belts and drive mechanisms.
 - 3. Lubricate all moving parts as required by manufacturer's operating instructions.
 - 4. Demonstrate to the Owner's representative and the Architect or Engineer the method and sequence of operation, and provide testing devices and/or data to verify that performance equals that specified.
 - 5. Provide operating instructions in bound form along with manufacturer's parts list and written warranties.

3.5 SCHEDULES

A. See next page for Request for Final Review from the Contractor(s):

(The rest of this page is left intentionally blank)

CONTRACTOR'S REQUEST FOR FINAL REVIEW FORM

	T:		1 \
(Name	of Project and DA Project Num	nber)
TO:	DARDEN ARCHITECTS, INC.		
		. West Avenue	
		NO, CA 93711	
FROM:_	Contra	ator	
(Conur	ictor)	
(Addre	ss)	
			and
((Date)	(Time)	
WE HE	REBY	, request and certify:	
	1. 2.	review, investigation and commitinal review as indicated earlie	asate the Architect at a rate of \$176.00 an hour for further ments if it is determined that the Project is not ready for the within this Specification Section. The Architect is herein or individuals listed by reference on the Drawings,
Submitte	ed By	(Contractor)	
	_		Below is
Signature	e		Below is for Use by Design Consultant only
Signature Firm	e		Below is for Use by Design Consultant only Conditions for Final Review Accepted
Signature Firm Address_	e		Below is for Use by Design Consultant only Conditions for Final Review Accepted Final Review Accepted as Noted
Signature Firm Address_ I	e Date		Below is for Use by Design Consultant only Conditions for Final Review Accepted Final Review Accepted as Noted Final Review Not Accepted By
Signature Firm Address_ I	e Date		Below is for Use by Design Consultant only Conditions for Final Review Accepted Final Review Accepted as Noted Final Review Not Accepted By Date
Signature Firm Address_ I	e Date		Below is for Use by Design Consultant only Conditions for Final Review Accepted Final Review Accepted as Noted Final Review Not Accepted By
Signature Firm Address_ I	e Date		Below is for Use by Design Consultant only Conditions for Final Review Accepted Final Review Accepted as Noted Final Review Not Accepted By Date

INTENTIONALLY LEFT BLANK

SECTION 017836 - WARRANTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. In addition to providing all other warranties specified in the Project Manual and without affecting any rights of Owner under State or Federal law, Contractor shall warrant that the Work done under this Project Manual will be free from faulty materials or workmanship and hereby agrees, upon receiving notification from the Owner or his Agent, to immediately remedy, repair or replace, without cost to the Owners and to his entire satisfaction, all defects, damages or imperfections appearing in said work within a period of one (1) year unless specified otherwise, after date of final acceptance by the Owner of all work done under this Project Manual, regardless of whether or not the Owner or persons operating under contract with the Owner partially or wholly occupies any portion of the work prior to acceptance. For work performed after completion, the one (1) year period shall be extended by the period of time between the date of final acceptance by Owner and actual performance of the work. This obligation shall survive acceptance of the work and termination of the Contract.
 - 1. Warranties shall be in the form outlined below and shall be submitted in duplicate to the Contractor and submitted on his own letterhead.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 SUBMITTALS

A.	Warranty	Form:	(foli	lowing	page.)
----	----------	-------	-------	--------	--------

(Contractor's Letterhead)	
Project Number:	

END OF SECTION

NOT APPLICABLE

SECTION 017839 - PROJECT DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Project As-Built Drawings.
 - 2. Project Record Drawings.
 - 3. Record Specifications.
 - 4. Record Product Data.
- B. Related Requirements: The following Project Manual Sections contain requirements that relate to this Section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.3 DEFINITIONS

- A. CONTRACT DOCUMENTS: Contract Documents include Contract Forms, Project Manual (Contract Requirements and Specifications), Drawings, Addenda, Change Orders and Modification Documents (Supplemental Instructions, Request for Information, Construction Change Directives).
- B. PROJECT "AS-BUILT" DOCUMENTS: A set of Contract Documents used during construction for recording of actual construction information during construction. The recording of construction information shall be maintained on the Contract Drawings and in the Project Manual.
- C. PROJECT "RECORD" DOCUMENTS: A set of Contract Documents used at the completion of construction for transferring and documenting the actual construction information recorded on the PROJECT "AS-BUILT" DOCUMENTS.
- D. RECORD PRODUCT DATA: A set of Submittals and Shop Drawings that have documentation of field changes made after review.
- E. AGENCY DOCUMENTATION: Documents required by the Agency Having Jurisdiction to be prepared and submitted by the contractor.

1.4 SUBMITTALS:

- A. Submit the following in accordance with specification Section SUBMITTAL PROCEDURES.
- B. Format for Submittals:
 - Accompany each submittal with a SHOP DRAWING AND SUBMITTAL TRANSMITTAL:
 - 2. PDF electronic file names shall match the Sheet Numbers of the Contract Documents.
 - 3. Provide labels on DVD's and DVD Cases and include the following:
 - 4. First Line: CLOSE-OUT DOCUMENTS
 - 5. If submittal contains multiple disks append to first line Disk, i.e. (1 of 2)
 - 6. Second Line: Project Name and Year
 - 7. Third Line: Architect Firm Name and Architect's Project Number
 - 8. Fourth Line: DSA or HCAI Number (if applicable)
 - 9. Fifth Line: Contractor Company Name
 - 10. PDF files for Project "Record" Documents and Record Product Data shall be combined with PROJECT CLOSEOUT, Maintenance Data and Operations Data, and WARRANTIES on a single set of DVD's.
- C. PROJECT "AS-BUILT" DOCUMENTS: Comply with the following:
 - 1. Number of Copies: Submit one paper-copy set of marked-up as-built drawings and one paper-copy of marked-up as-built specifications.
 - 2. Clearly Label each copy "PROJECT 'AS BUILT' DOCUMENTS" in two-inch-high printed letters.
- D. PROJECT "RECORD" DOCUMENTS: Comply with the following:
 - 1. Number of copies: Submit copies of the Record Documents as follows:
 - a. Initial Submittal:
 - 1) Submit one paper-copy of marked-up record drawings and one paper copy of marked-up record specifications,
 - 2) Alternatively, submit PDF electronic files of scanned marked-up record drawings and marked-up record specifications on one set of DVD's
 - 3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - 2. Final Submittal:
 - 3. Submit one paper-copy of marked-up record drawings, one paper copy of marked-up record specifications, and PDF electronic files of scanned marked-up record drawings and marked-up record specifications on three sets of DVD's.
 - 4. Each record drawing sheet shall be labeled, "PROJECT "RECORD" DOCUMENT.•
 - 5. Print each drawing, whether or not changes and additional information were recorded.
 - 6. Clearly Label each copy "PROJECT "RECORD" DOCUMENTS in two-inch-high printed letters in a prominent location.
- E. RECORD PRODUCT DATA: Comply with the following:
 - 1. Number of Copies:
 - a. Submit one paper-copy set of marked-up shop drawings.
 - b. Submit three DVD's of PDF electronic files of scanned marked-up shop drawings.
- F. AGENCY DOCUMENTATION: Comply with the following:
 - 1. Submit Documentation Required by the Agency Having Jurisdiction utilizing the format and system established by the Agency.

1.5 SYSTEM DESCRIPTION

- A. The Architect considers the Project Record Documents to be of significant importance to the Owner.
- B. Project Record Documents provide important information for the Owner's records, they form an invaluable record for future reference for concealed conditions, facilities management processes, and future additions and renovations.

PART 2 - PRODUCTS

2.1 General:

- A. All costs (including the time) required for recording, transferring, and copying all documentation shall be part of the Contractor's Overhead Expense.
- B. Provide red pencil or ink (contrasting color) for all marking of the PROJECT "AS-BUILT DOCUMENTS, PROJECT "RECORD" DOCUMENTS, and RECORD PROJECT DATA.
- C. Do not permanently conceal any work until required information has been recorded.

2.2 RECORD DRAWINGS

- A. PROJECT "AS-BUILT" DOCUMENTS: Maintain one set of marked-up paper copies of the Contract Drawings: and Specifications, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Elevation for finish grade for all points indicated on Site Grading Plan.
 - b. Depths of various elements of foundation in relation to first floor finish elevation.
 - c. Horizontal and vertical location of underground utilities and appurtenances referenced to visible and accessible features of structure.
 - d. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities Field changes of dimensions and details.
 - j. Changes made by Addenda, Change Orders and other Modification Documents.
 - k. Details not on original Contract Documents.
 - 1. Changes made on Shop Drawings.

- 3. Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 - a. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - b. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - c. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - d. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 - e. Note related Changes Orders, record Product Data, and record Drawings where applicable.
- 4. Mark the Contract Drawings and Specifications completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
- 5. Note Request for Information numbers, Supplemental Instruction numbers, Construction Change Directive numbers, Change Order numbers, and similar identification, where applicable.

2.3 PROJECT "RECORD" DOCUMENTS:

A. General: Transfer all changes, notations, etc. from the "AS-BUILT" PROJECT DOCUMENTS to the "PROJECT RECORD" DOCUMENTS in the same quality as the original Contract Documents.

2.4 RECORD PRODUCT DATA

- A. Maintain one set of marked-up paper copies of the Shop Drawings and Product Data, incorporating any modifications to the reviewed documents.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders and record Drawings where applicable.
 - 4. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.5 AGENCY DOCUMENTATION

- A. Contractor shall prepare and upload all applicable forms pertaining to the Contractor as required by the Division of State Architect DSA Procedure 13-02, including but not limited to:
 - 1. DSA 6-C Contractor Verified Report.
 - 2. NFPA System Record of Completion.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE:

A. Recording:

- 1. Keep all documents current, PROJECT "AS-BUILT" DOCUMENTS shall be kept current at all times. Post changes and revisions to project as-built documents as they occur; do not wait until end of Project.
- 2. The Project Inspector will review the PROJECT "AS-BUILT" DOCUMENTS periodically for the Architect at the time Payment Requests are processed. Should the PROJECT "AS-BUILT DOCUMENTS not be current and up to date, the Owner reserves the right to hold the Payment Request until compliance with the Contract Documents has occurred.

B. Maintenance of Documents:

- 1. Maintain at job site the following:
 - a. Contract Drawings.
 - b. Project Manual/Specifications.
 - c. Addenda.
 - d. Reviewed shop drawings.
 - e. Change Orders.
 - f. All Modification Documents.
 - g. Field test records.
- 2. Store documents in field office apart from documents used for construction.
- 3. Provide files and racks for storage of documents.
- 4. File documents in accordance with Project Filing Format or Uniform Construction Index.
- 5. Maintain documents in clean, dry, legible condition.
- 6. Do not use record documents for construction purposes.
- 7. Make documents available at all times for inspection by Architect, Owner and Owner's Inspector.

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 024919 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Section includes requirements governing execution of the work including, but not limited to, the following:
 - a. Demolition and removal of selected portions of building or structure.
 - b. Demolition and removal of selected site elements.
 - c. Salvage of existing items to be reused or recycled.
 - d. Demolition of entire small buildings or structures.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP

1.2 REFERENCES

- A. Standards:
- B. In accordance with the latest edition of the following standards:
 - 1. ANSI A10.6 American National Standards Institute

1.3 DEFINITIONS

- A. Remove: Detach items from existing site or building (s) and legally dispose or recycle off-site.
- B. Remove and Salvage to Owner: Carefully detach from existing site or building (s), in a manner to prevent damage, and deliver to Owner.
- C. Remove and Reinstall: Detach items from existing site or building (s), prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing item(s) within project site that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Shop Drawings:
 - a. Proposed Protection Measures Submit report and drawings that indicates the measures proposed for protecting individuals and property for dust and noise control.
 - 1) Indicate proposed locations and construction of barriers.

- 2) Indicate occupant paths of egress and travel.
- 3) Indicate how long utility services will be interrupted.
- b. Salvaged Item Inventory List
 - 1) Indicate items to be salvaged and delivered to Owner.
- 2. Closeout Submittals:
 - a. Existing Warranties
 - b. Pre-demolition Photographs

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:

- 1. In accordance with Specification Section REGULATORY REQUIREMENTS and the following:
 - a. CARB Materials and equipment used for this project shall comply with the current applicable regulations of the California Air Resources Board and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. CAL/OSHA California Division of Occupational Safety and Health Administration.
 - c. CF County of Fresno, codes and ordinances
 - d. EPA Environmental Protection Agency

B. Meetings:

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

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Cleaning, handling, and packing:
 - 1. Salvaged Items and Reinstalled Items shall be handled in such a manner as to assure that they are free from damage.
 - 2. Salvaged Items shall be cleaned and packed or cleaned and palleted.
 - 3. Reinstalled Items shall be cleaned.

B. Storage and protection

- 1. Salvaged Items and Reinstalled Items shall be stored in a dry, protected area.
- 2. Salvaged Items and Reinstalled Items shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation underneath.

3. Cover with protective waterproof covering providing for adequate air circulation and ventilation.

C. Waste Management and Disposal:

 Disposal of all selective demolition items shall be per Specification Section -CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL.

1.7 PROJECT CONDITIONS

A. Environmental requirements:

- 1. Dust control perform site, exterior, and interior work in a manner as to minimize the spread of dust and flying particles.
 - a. Thoroughly moisten appropriate surfaces as required to prevent dust from being a nuisance to the occupants, public, and neighbors.
- 2. Noise control perform work in a manner as to minimize construction noise.
 - a. When a certain level of noise is unavoidable and is objectionable to the occupants of the adjacent spaces, buildings, or premises, coordinate with Owner and make arrangements to perform such work at the most appropriate time periods of the day.

B. Existing conditions:

- Examine project site and building(s) and compare it with the drawings and specifications.
 Thoroughly investigate and verify conditions under which the work is to be performed.
 No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
- 2. Conduct work so as not to interfere unnecessarily with adjacent buildings, roads, streets, drives, and walks.
 - a. Do not close or obstruct streets, alleys, walks, or passageways without permission from authorities having jurisdiction and coordinating same with immediate neighbors whose business operation may be affected.
 - b. Safety measures shall be taken to insure an uninterrupted flow of traffic around the site as required by local Police and Fire Departments
- 3. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- 4. Maintain existing utilities indicated to remain in service and protect against damage during selective demolition work.
 - a. Maintain fire-protection facilities in service during the work.
- 5. Demolition waste becomes the property of the Contractor.
- 6. Storage or sale of removed items on-site is not permitted.
- 7. It is not expected that hazardous materials will be encountered in the Work.
 - a. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.

1.8 WARRANTY

A. Existing Warranties:

- 1. Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warranter before proceeding. Existing warranties include the following:
 - Roofing system
- 2. Notify warranter on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Furnish all materials, tools, equipment, facilities, and services as required for performing the selective demolition and removal work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of conditions:

- 1. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
- 2. Execution of work under this specification section shall constitute acceptance of existing conditions.
- 3. Obtain all necessary permits and authorizations by regulatory agencies required to perform the Work under this Section.
- 4. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- 5. Verify that rooftop utilities and service piping have been shut-off prior to roof selective demolition.
- 6. Record existing conditions by use of Pre-demolition Photographs.
 - a. Inventory and record the condition of items to be salvaged and/or re-installed.

3.2 PREPARATION

A. Coordination:

- 1. Before proceeding, verify plans match existing conditions.
- 2. Review documents of existing construction provided by Owner against existing conditions.
- 3. If conflicts are encountered, report it to the Architect. Then prepare recommendation(s) for correction and submit to Architect for review.
- 4. Coordinate work under this specification section with work specified under other sections.
- 5. Coordinate any utility and HVAC unit shut-down with owner 48 hours in advance of the anticipated shut-down.
 - a. Do not interrupt utilities and HVAC units serving occupied or used facilities, except when authorized in writing by the Owner.
 - b. Provide temporary service during interruptions to existing facilities, as may be required by the Owner to maintain essential services.
- 6. Prior to roofing selective demolition, coordinate with Owner to shut down air intake equipment and service piping in the vicinity of work.

B. Protection:

- 1. Structure and Property:
 - a. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings, landscape, and facilities to remain.

- b. All damage inflicted on public and private property and the property of the Owner shall be repaired or restored to the original condition prior to the start of this Work. All repair or replacement work shall be done at no additional cost to the owner.
- c. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building and site.
- d. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and other weather damage to building envelope, structure, and interior areas.
- e. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
- f. Protect and maintain utility services and mechanical/electrical systems to remain.
- g. Cover and protect furniture, furnishings, and equipment that have not been removed.
- h. Cover all air supply and return ducts to remain before proceeding with demolition work.
- i. Cover air intake louvers before proceeding with work that will affect indoor air quality.
- j. During roof selective demolition have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.

2. Temporary Shoring:

- a. Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1) Strengthen or add new supports when required during progress of selective demolition.

3.3 APPLICATION

A. General:

- 1. Selective demolition shall include the removal of all components of the existing building and/or site described in the documents to be removed. Unless otherwise specified, the component identified for removal shall include all materials, accessories and fabrications associated with that component.
- 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.
 - a. Temporarily cover opening to remain.
 - b. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces.
- 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
- 4. When removing structural framing members, lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
- 5. Locate selective demolition equipment and demolished debris so as not to impose excessive loads on supporting walls, floors, or framing.
- 6. Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems.
- 7. Removed and Salvaged items:
 - a. Clean salvaged items.
 - b. Pack or crate items after cleaning. Identify contents of containers.
 - c. Store items in a secure area until delivery to Owner.
 - d. Transport item to Owner's storage area on-site.

- e. Protect items from damage during transport and storage.
- f. In addition to items indicated elsewhere, salvaged items that the Owner wants to retain in usable condition are as follows:
 - 1) All door hardware
 - 2) All unit heater and controls
 - 3) All energy management controls
 - 4) All security system devices
- 8. Removed and Reinstalled items:
 - a. Clean and repair items to functional condition adequate for intended reuse.
 - b. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - c. Protect items from damage during transport and storage.
 - d. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- 9. Existing Items to Remain:
 - a. Protect construction indicated to remain against damage and soiling during selective demolition.

B. Site Selective Demolition:

- 1. Utility lines to be abandoned within the construction area shall be removed and stubbed off outside the limits of construction.
- 2. Maintain existing storm drainage system to remain in functioning condition. Prevent debris from entering or blocking drains and piping. Use drain plugs specifically for this purpose. Remove drain plugs at the end of each work day.
- 3. Remove debris, concrete, asphalt, and any other obstruction to the extent indicated.
- 4. Remove all:
 - a. Buried objects which will interfere with the Work.
 - b. Irrigation lines, irrigation risers, and irrigation valves.
 - c. Stand pipes.
- 5. At building pads, site improvements, or trenching, strip topsoil which contains:
 - a. Grass, weeds, and natural vegetation to a minimum depth of 12 inches.
 - b. Stumps and roots 1/4 inch and larger.
- 6. Remove non-soil materials from topsoil, including clay lumps, gravel, trash, debris, weeds, roots, other waste materials, and objects more than 1/2 inch in diameter.
- 7. Stockpile reusable topsoil away from excavation and where work is to proceed.
 - a. Do not stockpile topsoil within drip line of remaining trees.
- 8. Non-soil materials removed from topsoil shall be separated into like materials and recycled either within the project or removed from the project site to a recycling station.
 - a. Those waste materials that are non-recyclable shall be legally disposed off of the project site.

C. Roofing Selective Demolition:

- Maintain roof drains in functioning condition to ensure roof drainage at end of each work day. Prevent debris from entering or blocking roof drains and conductors. Use roof drain plugs specifically for this purpose. Remove roof drain plugs at end of each work day, when no work is taking place, or when rain is forecast.
- 2. Remove existing roofing membrane and other roofing system membrane components down to the deck including flashings, copings, and roof accessories.

3.4 CLEANING

- A. Clean in accordance with Specification Section PROJECT CLOSEOUT:
 - 1. Clean any soiled surfaces to remain immediately.

- 2. Existing substrates shall be clean and ready for the installation of any additional materials.
- 3. Leave site areas level and free of any ruts or debris. Appearance of earth surface shall be equal to or better than adjacent undisturbed surfaces.

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 031101 – CONCRETE FORMWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Concrete Formwork materials, and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 15 14 DRILLED ANCHORS
 - 4. 03 20 00 REINFORCEMENT
 - 5. 03 30 00 CAST-IN-PLACE CONCRETE
 - 6. 03 35 00 POLISHED CONCRETE FINISHING
 - 7. 05 12 00 STEEL AND FABRICATIONS
 - 8. 06 10 00 ROUGH CARPENTRY
 - 9. 07 92 00 SEALANTS
 - 10. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

- 1. In accordance with the latest edition of the following standards:
 - a. ACI American Concrete Institute
 - b. APA The Engineered Wood Association (formerly the American Plywood Association)
 - c. PS Product Standards of the U.S. Department of Commerce, latest edition
 - d. WCLIB West Coast Lumber Inspection Bureau

1.3 DEFINITIONS

- A. Terms used throughout this section.
 - 1. Unexposed:
 - a. "Unexposed to View" for determining what forms to use for an unfinished concrete surface.
 - 2. Exposed:
 - a. "Exposed to View" for determining what forms to use for a finished concrete surface.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - a. Forming materials.

- b. Tie rods and spreaders.
- c. Formwork for exposed concrete.
- d. Form coatings and release agents.
- 2. Shop Drawings:
 - a. The Contractor shall submit drawings showing the proposed form tie locations for exposed form indentations.
- 3. Samples.
 - a. Form liners for specific finished concrete surfaces.
- 4. Quality Assurance/Control Submittals:
 - a. Manufacturer's written Instructions:
 - 1) Instructions for specific form liner manufacturer indicated.
- 5. Closeout Submittals:
 - a. Record Documents in accordance with Specification Section PROJECT DOCUMENTS.

1.5 QUALITY ASSURANCE

A. Qualifications:

- 1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
- 2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the Work.
- B. Regulatory Requirements:
 - 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Mockups:

- 1. Cast in accordance with Specification Section CAST-IN-PLACE CONCRETE, Part 1 Article titled "SUBMITTALS", paragraph titled "Mockups" for requirements.
 - a. Provide with all applicable joints, grooves, textures, etc.

1.6 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period: One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES.
 - a. Warranty Period: One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified product manufacturer:
 - a. MDO Plywood: SIMPSON TIMBER PRODUCTS.
 - b. HDO Plywood: SIMPSON TIMBER PRODUCTS.
 - 2. Specified product accessories:
 - a. Chamfer Strips: MEADOW / BURKE COMPANY.
 - b. Cement Compound Plugs: MEADOW / BURKE COMPANY.
 - c. Double Sided Foam Tape: 3M COMPANY.
 - d. Rustication Strips: MEADOW / BURKE COMPANY.e. Spreaders and Ties: MEADOW / BURKE COMPANY.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Unexposed finish forms:
 - 1. Provide plywood, lumber, or another acceptable material.
 - a. Lumber shall be dressed on at least two edges and one side for tight fit, complying with WCLIB Standard Grading and Dressing Rules #17, for Douglas Fir Form Lumber.
 - b. When plywood is used, provide panels complying with PS1, B-B (Concrete Form) Plywood, Group 1, EXT-APA mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Exposed finish forms:
 - 1. Provide plywood panel type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practical sizes to minimize number of joints and to conform to joint system shown on the drawings.
 - a. Single Pour Forms: Provide liner panels that are complying with PS1, MDO Plywood, B-B, Group 1, EXT-APA, mill-oiled, edge-sealed, with each piece bearing legible inspection trademark, which are limited to "single-pour use" forms, that are manufactured by SIMPSON TIMBER PRODUCTS, or approved equivalent.
 - b. Multiple Pour Forms: Provide HDO Plywood "Multipour" liner panels, which are limited to "double-pour use" forms, that are manufactured by SIMPSON TIMBER PRODUCTS, or approved equivalent.
- C. Non-Compressive High Density Foam Fill:
 - 1. Foam-Control Geofoam, EPS19, complying with ASTM D 6817 "Standard Specification for Rigid Cellular Polystyrene Geofoam", with the following physical characteristics:

- a. Density, min., kg/m^3 : 18.4.
- b. Compressive Resistance, @ 1 percent deformation, min., psi: 40.0.
- c. Flexural Strength min., psi: 207.0.
- d. Oxygen index, min., volume percent: 24.0.
- 2. Accessories: Provide all adhesives, "geogripper" plates, etc. to comply with manufacturer's written installation instructions for a complete and functional installation.

2.3 ACCESSORIES

A. Cement Compound Plugs:

- Provide gray colored cement compound plugs ("SnaPlug" by MEADOW / BURKE, or approved equivalent) in highly visible concrete surface areas.
 - a. Provide "flush type" in cone holes of size appropriate to the hole size created by tie-holes.
- 2. Provide a waterproof neoprene adhesive ("SnaPlug Bonder" by MEADOW / BURKE, or approved equivalent), resistant to weather aging and bacterial growth, for adhering cement compound plugs into cone holes.

B. Chamfer Strips:

- 1. Provide wood chamfer strips free of knots, for forming edges of cast-in-place concrete.
- C. Double Sided Foam Tape: Provide "Scotch" double sided, high density, pressure sensitive adhesive, foam tape as manufactured by The Tape Division of 3M PRODUCTS, INC., or approved equivalent.

D. Form release agent:

- Provide commercial formulation form release agent with a maximum volatile organic compounds (VOC's) in compliance with the CARB in the area where the project is located, that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- 2. Provide form liner manufacturer's form release agent when a particular form liner is used to maintain compatibility with form release agent and the form liners used for this project.

E. Rustication Strips:

 Provide wood rustication strips free of knots, for forming straight continuous reveals (either vertically or horizontally) and PVC rustication strips as manufactured by MEADOW / BURKE, for forming curved continuous reveals (either vertically or horizontally).

F. Spreaders and ties for loose plywood forming:

1. Spreader Ties: Use metal spreaders and ties for surfaces to be sacked. Use type that will give positive tying and accurate spreading for accurate sizing of cast walls or forms. Snap type shall leave no metal closer than 1-1/2 inches from exposed surface of concrete and have spreader cones no larger than 1 inch diameter.

G. Nailer Strip:

- 1. Provide decay resistant pressure treated wood nailer strips of sizes and locations indicated on the drawings.
 - a. For roof systems, provide compatible materials with the roof system manufacturer's applications.
 - b. Provide fire retardant pressure treated wood nailer strips when the roof assembly requires a Class A rating.

 All pressure treated wood (decay or fire-retardant) shall be in accordance with the applicable standards of the AWPA as referenced in the Specification Section - ROUGH CARPENTRY.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface preparation:

 Consult with other Trades relative to required openings, and items to be embedded in concrete (i.e., piping, conduit, hangers, reglets, anchors, inserts, sleeves, etc.). Coordinate work specified under other sections to ensure proper, adequate interfacing between trades, for openings, chases, blockouts, and other required interfacing items.

3.2 ERECTION

A. All formwork shall be:

- 1. Designed and constructed in accordance with ACI Standard 347 "Recommended Practice for Concrete Formwork".
 - a. Follow ACI 303R "Guide to Cast-In-Place Architectural Concrete" for further recommendations in design and use of Patterned Form Liners.
- 2. Construct to size, shape, alignment, elevation and position of all concrete elements.
 - a. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features required in the work. Use selected materials to obtain required finishes.
 - b. Orient circular fiberglass forms so that the seam is always facing the nearest adjacent wall, or an obscure side not highly visible. Contact the Architect for conditions not easily determined.
- 3. Properly separate and securely tie with Spreaders and Ties to maintain proper shape. Wood spreaders shall not be allowed to remain in concrete work.
 - a. Use "Penta-Ties" where indicated on the drawings. Glue in cement compound plugs.
- 4. Brace, support and center sufficiently to carry without excessive deflection all live and dead loads imposed during construction and placement of concrete, and to insure safety to workers and passersby.
 - a. Block adjoining permanent pan units left in place to prevent lateral deflection of forms while placing concrete.
- 5. Properly construct to eliminate all open joints or discontinuous surfaces.
 - a. Solidly butt joints with double sided foam tape, apply silicone sealant at concrete face, and provide backup at joints to prevent cement paste or mortar from leaking.

B. All joints shall be:

- 1. Uniform and backed by 2 inch material.
- 2. Continuous and level or plumb.
- 3. Sufficiently tight (with double sided foam tape and silicone sealant) to prevent leakage of cement paste.
 - a. Locate joints of formwork whenever possible at rustication joints.
- 4. Subject to Architect's approval.

3.3 INSTALLATION

- A. General: Design, engineer, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position.
 - 1. Access Openings: Shall be provided in forms for cleaning and inspection of forms and reinforcement.
 - a. In Wall Forms: Provide openings for each pour, composed of a form section held out until inside of each formed cavity has been cleaned, so that no "access hole" is visible in the finished concrete surface.
 - 2. Architectural Concrete elements shall be formed with MDO (or HDO) form plywood where face uniformity is required such as on signs, plaques, kiosks, and landscape elements.
 - 3. Side forms at unexposed footings may be omitted if excavation stands without caving.
 - a. Make footing trench two (2) inches wider than width of concrete footing indicated on the drawings, when earth is used as a form.
 - b. Cut trenches true and straight.
 - c. Make side cuts neat and plumb.
 - d. Bottom of trenches shall be level with reasonably sharp corners.
 - 4. Formwork above grade (stairs, curbs, exposed faces of concrete foundations, etc.) shall be:
 - a. Plywood type as specified treated with Sealer.
 - b. Constructed with plumb and level joints.
 - c. Separated with removable or snap type Spreaders and Ties. Do not use wire ties.
 - 5. Unintentional indentations in the surface of the concrete left after removal of spreaders and ties shall be filled and sacked unless the architect's approval is given to do otherwise.
 - a. Install Cement Compound Plugs where exposed form tie indentations occur.
 - 6. Sleeves, anchors and bolts, angles, supports, ties and other materials in connection with concrete construction shall be secured in position before the concrete is placed.

3.4 CONSTRUCTION

- A. Special Techniques Form Removal and Reuse of Forms:
 - 1. All forms shall be completely removed.
 - 2. Time of Removal shall be in accordance with ACI 301 "Specifications for Structural Concrete", which requires concrete to reach its specified compressive strength. Variations to the time of removal are listed below subject to the concrete reaching its specified compressive strength:
 - a. Dependent on weather conditions.
 - 1) Due to excessive cold weather for a long duration of days, and subject to the Architect's approval, the time for removal may be extended if deemed necessary.
 - b. Dependent on cylinder test results.
 - c. Dependent on recommendations of additive manufacturer when additives are admitted to the mix.
 - d. Typically (verify with three statements above before initiating the following):
 - 1) Foundation Side Forms: Five (5) days after concrete is poured.
 - 2) Wall Forms: Ten (10) day after concrete is poured.
 - 3) Column Forms: Ten (10) days after concrete is poured.
 - 4) Beam, Slab and Joist Soffit Forms:

- a) Twenty-One (21) days after concrete is poured.
- b) Re-shore as required to support dead loads and any construction loads applied.
- e. Remove forms in a manner that will not harm concrete. Do not hammer or pry against concrete.
- 3. Nails, tie wires and form ties shall be cut off flush with face of concrete.
- 4. Snap type spreaders to be snapped off inside the wall surface.
- Clean and repair surfaces of forms to be reused in the work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces.
 Apply new form-release compound as specified for new formwork.
- 6. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to the Architect.

B. Site Tolerances:

- 1. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 "Guide to Formwork for Concrete" limits:
 - a. Provide Class A tolerances (permitted irregularities are 1/8" in 10' for both gradual and abrupt) for all concrete surfaces exposed to view, or surfaces that will receive additional applied finishes.
- 2. Concrete work out of alignment, or level or plumb exceeding the allowable tolerance will be cause for rejection of the whole work affected. Such work shall be removed and replaced as directed by Architect with no additional cost to Owner.

3.5 CLEANING

- A. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Re tighten forms and bracing before placing concrete, as required, to prevent leakage of cement paste and maintain alignment.
- B. Remove all wood used for formwork from trenches. No wood shall be left buried in the earth.
- C. Final cleaning shall be in accordance with Specification Section PROJECT CLOSEOUT.

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 031514 – DRILLED ANCHORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all Drilled Anchor materials, labor, equipment and services necessary for Expansion, Adhesive, and Screw Anchors in Concrete, and Concrete Masonry Units, and related items necessary to complete the Project as indicated by the Contract Documents unless otherwise specifically excluded.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 11 01 CONCRETE FORMWORK
 - 4. 03 20 00 REINFORCEMENT
 - 5. 03 30 00 CAST-IN-PLACE CONCRETE
 - 6. 05 12 00 STEEL AND FABRICATIONS
 - 7. 06 10 00 ROUGH CARPENTRY
 - 8. 06 41 23 MODULAR CASEWORK
 - 9. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - a. Submit manufacturer's product data for all expansion and adhesive anchors to be used in this project.
 - 1) Submit current ICC Evaluation Services research or evaluation reports evidencing maximum allowable shear and withdrawal load data.
 - 2. Quality Assurance / Control Submittals:
 - a. Test Reports: Submit to DSA, copy to Project Inspector and Contractor.
 - 1) Tension Testing as required.

1.3 QUALITY ASSURANCE

- A. Single Source Responsibility:
 - 1. To ensure consistent quality of anchorage, obtain drilled anchors from a single manufacturer.
 - 2. To ensure consistency of anchorage, obtain adhesive for anchorage from a single manufacturer.
- B. Manufacturer Qualifications: Provide drilled and adhesive anchors from a manufacturer that can demonstrate ICC approvals that are current and acceptable to review by the DSA/SSS.
- C. In accordance with Specification Section REGULATORY REQUIREMENTS and the following:
 - 1. ICC International Code Council.

- 2. IR Interpretation of Regulations.
- D. Job Testing: For verifying satisfactory installation workmanship, an independent laboratory will perform proof load tests of drilled anchors acting in tension or shear in the presence of the Project Inspector.
 - When drilled-in expansion-type anchors or other post-installed anchors acceptable to the
 enforcement agency are used in lieu of cast-in-place bolts, the allowable shear and
 tension values and installation verification test loads shall be acceptable to the
 enforcement agency.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in original, unopened packages with manufacturer's labels identifying products legible and intact.
- B. Store materials inside, under cover and in a manner to keep them dry, protected from the weather, surface contamination, corrosion, damage from construction traffic and other causes.

1.5 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period: One (1) Year.
- C. Installer's Warranty:
 - In accordance with the terms of the Specification Section WARRANTIES.
 - a. Warranty Period: One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified Product Manufacturer:
 - a. Expansion Anchors:
 - 1) HILTI INC.
 - 2) Acceptable Alternative Manufacturers:
 - a) DEWALT.
 - b) SIMPSON.
 - b. Adhesive Anchors:
 - 1) HILTI INC.
 - 2) Acceptable Alternative Manufacturers:

- a) DEWALT.
- b) SIMPSON.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Provide manufacturers standard drilled anchors (expansion or adhesive) for installation into Concrete or Concrete Masonry Units unless noted otherwise.
 - 1. Metal Finishes (corrosion resistant):
 - a. Zinc Plated Carbon Steel.
 - b. Stainless Steel.

B. Expansion Anchors:

- 1. Wedge Anchors: The WEDGE category features a small split expansion ring installed on a tapered (integral cone) part of the stud at the bottom. As the nut is tightened, withdrawing the stud portion from the hole, the expansion ring engages the concrete and is further expanded on the tapered part of the stud.
- 2. Sleeve Anchors: The SLEEVE category is similar to the wedge except a large expansion sleeve is used instead of a small expansion ring. The outside of the sleeve defines the anchor diameter with the threaded stud being of a smaller diameter since it fits inside the sleeve. The stud has an integral cone expander at the bottom similar to the wedge category. The expansion mechanism is similar to the wedge category except the top of the sleeve is normally in contact with the nut/washer and is initially forced down over the cone expander as the anchor is tightened. As the sleeve is expanded, it engages the concrete and continues to expand as the wedge anchor.
- 3. Shell Anchors: The SHELL category has the most variations, but all use a tapered cone expander, either internal or external, to expand the shell of the anchor against the hole. The anchor is either hammered down over an external expander or a special tool is used to drive an internal expander further into the anchor.
- C. Adhesive Anchors which chemically bonds Steel Rods or Deformed Steel Reinforcement Dowels to concrete or masonry elements:
 - 1. Threaded Steel Rods with minimum yield strength of 36 ksi and complying with ASTM A36 "Specification for Carbon Structural Steel," or ASTM A193 "Specification for Alloy-Steel and Stainless Steel Building Materials for High Temperature or High Pressure Service and Other Special Purpose Applications," Grade B7.
 - 2. Deformed Steel Reinforcement Dowels shall be a minimum of Grade 60 and comply with ASTM A615 "Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement" or ASTM A706 "Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement".
 - 3. Adhesives, consisting of two primary components that are stored separately, and having a mixing nozzle provided by the manufacturer combining the components prior to placing in the holes.
 - 4. Long term durability and stability of the adhesive anchor material and its resistance to loss of strength and chemical change at elevated temperatures shall be established to the satisfaction of the enforcement agency.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordination:

1. Coordinate and provide anchors and installation instructions from the manufacturer for items to be embedded in Concrete or Concrete Masonry Unit construction.

Manufacturer's written installation instructions shall be available on the project site.

3.2 INSTALLATION

- A. Fastening to In-Place Construction: Provide anchorage devices where necessary for securing designated items indicated on the drawings, or as necessary for a complete and proper job to in-place construction.
 - 1. Install the anchors in accordance with the requirements given in the ICC Evaluations Services Report recommendations for the specific anchor used.
 - 2. When installing expansion anchors through metal deck into concrete, the anchors should be installed in the center of the low flute of the decking where practicable in minimum 20 gage deck.
 - a. The minimum depth of embedment shall be 1-1/2 inches above the top flute of the decking (except 1/4 and 5/16-inch diameter anchors for ceilings) when the slab thickness above the top of the flute is at least 3 inches.
 - b. Shell type anchors <u>shall not be used</u> on the underside of concrete and metal deck construction due to damage caused to the concrete when hammering in the shell anchors.
 - 3. Install Adhesive Anchors by placing adhesive into specially prepared holes, then insert rods or dowels into holes in a manner that disperses the adhesive to assure maximum contact between adhesive, surface of the holes and surface of the anchor.
 - a. Adhesive anchors shall not be used in overhead applications.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling and fitting required for designated items of construction. Set work accurately in location, alignment and elevation, level true and free of rack, measured from established lines and levels.
 - 1. The minimum edge distance and spacing of wedge and adhesive anchors shall not be less than ten (10) diameters or as required by ICC Evaluation Service Report unless specifically shown on drawings.
- C. Use care and caution to avoid cutting or damaging reinforcing bars in Reinforced Concrete or Concrete Masonry Construction.
- D. Do not install expansion or adhesive anchors in recently placed concrete which has not had a minimum 28 day curing period and which has not been accepted as having a minimum compressive strength of 3000 psi.

3.3 FIELD QUALITY CONTROL

A. Testing, General:

1. Perform testing in accordance with ACI 318 "Building code Requirements for Structural Concrete and Commentary," and herein specified.

- a. When expansion or adhesive anchors are listed for sill plate bolting applications, 10 percent of the anchors shall be tension tested.
- b. When expansion or adhesive anchors are used for other structural applications, all such anchors shall be tension tested.
 - 1) Expansion-type anchors shall not be used as hold-down bolts.
- c. When expansion or adhesive anchors are used for nonstructural applications such as equipment anchorage, 50 percent or alternate bolts in a group shall be tension tested, except that if the design load is less than 75 pounds, only one anchor in ten need be tested. See drawings for items weighing 75 pounds or less.
 - 1) The tension testing of the anchors shall be done in the presence of the Project Inspector and a report of the test results shall be submitted to the enforcement agency DSA/SSS.
- 2. When expansion anchors are used for ceiling hanger wires, 1 out of 10 must be field tested for 200 pounds of tension per IR 25-2.
 - a. When expansion anchors are used for ceiling bracing wires, 1 out of 2 must be field tested for 440 pounds in tension.
 - b. Test ceiling anchors with wires attached.
- 3. The proof load may be applied by any method that will effectively measure the tension in the anchor, such as direct pull with a hydraulic jack, calibrated spring-loading devices, etc.
- 4. If any anchor fails testing, test all anchors of the same category not previously tested until twenty (20) consecutive pass, then resume the initial testing frequency.
 - a. The cost of any additional testing as a result of failures shall be the responsibility of the Contractor at no additional cost to the Owner.
- 5. When a drilled-in adhesive anchor is used in lieu of a required cast-in-place bolt, cost of testing shall be the responsibility of the Contractor at no additional cost to the Owner.

B. Testing:

- 1. Expansion Anchors:
 - a. Anchor diameter refers to the thread size for the WEDGE & SHELL categories, and to the anchor outside diameter for the SLEEVE category and Adhesive anchors.
 - b. Apply proof test loads to WEDGE & SLEEVE anchors without removing the nut if possible. If not, remove nut & install a threaded coupler to the same tightness of the original nut using a torque wrench & apply load.
 - c. For SLEEVE/SHELL internally threaded categories, verify that the anchor is not prevented from withdrawing by a baseplate or other fixtures. If restraint is found, loosen and shim or remove fixture(s) prior to testing.
 - d. Reaction loads from test fixtures may be applied close to the anchor being tested, provided the anchor is not restrained from withdrawing by the fixture(s).
 - e. SHELL type anchors shall be tested as follows:
 - 1) Visually inspect 25 percent for full expansion as evidenced by the location of the expansion plug in the anchor body.
 - a) Plug location of a fully expanded anchor shall be as recommended by the manufacturer, or, in the absence of such compensation, as determined on the job site following the manufacturer's written installation instructions.
 - b) At least 5 percent of the anchors shall be proof loaded as indicated in the Test Values schedule on the drawings, but not less than three anchors per day for each different person or crew installing anchors. or;
 - c) Test installed anchors per ACI 318 "Building code Requirements for Structural Concrete and Commentary."
- 2. Adhesive Anchors:

- a. Adhesive anchors shall be tension tested. The tension test load shall equal twice the allowable load for the specific location of the anchor to be tested (i.e., accounting for edge distance) or 80 percent of the yield strength of the bolt (0.8AbFy), whichever is less.
 - 1) The test procedure for expansion-type anchors in the test values table shall also be used for the adhesive anchors.
- b. Where adhesive anchors are used as shear dowels across cold joints in slabs-on-grade and the slab is not part of the structural system, testing of those dowels is not required.
- c. Anchors shall exhibit no discernible movement during the tension test.
- 3. Test equipment (including torque wrenches) is to be calibrated by an approved testing laboratory in accordance with standard recognized procedures.
 - a. Alternate torque test procedures and test values for SHELL type anchors may be submitted to the enforcement agency for review and approval on a case-by-case basis when test procedures are submitted and approved by the enforcement agency.
- 4. The following criteria apply for the acceptance of installed anchors:
 - a. HYDRAULIC RAM METHOD: The anchor should have no observable movement at the applicable test load. For wedge and sleeve type anchors, a practical way to determine observable movement is that the washer under the nut becomes loose.
 - b. <u>TORQUE WRENCH METHOD:</u> The applicable test torque must be reached within the following limits:
 - 1) Wedge or Sleeve Type: One-half (1/2) turn of the nut.
 - One-quarter (1/4) turn of the nut for the 3/8 inch sleeve anchor only.
 - 2) Torque testing of adhesive anchors is not permitted.
- 5. If the manufacturer's recommended installation torque is less than the test torque note in the table, the manufacturer's recommended installation torque shall be used in lieu of the tabulated values.
- 6. Testing should occur 24 hours minimum after installation of the subject anchors.
- 7. Required Maximum Test Values for Concrete, or Concrete Masonry Units in tension for the ranges and sizes of Drilled Anchors are shown on the drawings.

END OF SECTION

SECTION 032000 - REINFORCEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all reinforcement material, labor, equipment and services necessary to completely install all reinforcing materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 11 01 CONCRETE FORMWORK
 - 4. 03 15 14 DRILLED ANCHORS
 - 5. 03 30 00 CAST-IN-PLACE CONCRETE
 - 6. 05 12 00 STEEL AND FABRICATIONS
 - 7. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

- A. The following References and Manufacturer's Standards shall apply to this Specification Section:
 - 1. ACI American Concrete Institute
 - 2. ASTM American Society for Testing and Materials
 - 3. AWS American Welding Society
 - 4. CRSI Concrete Reinforcing Steel Institute

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data:
 - a. Manufacturer's specification and installation instructions for splice devices.
 - 1) Bar supports.
 - 2. Shop Drawings
 - a. Detail in accordance with ACI 315 "Details and Detailing of Concrete Reinforcing".
 - b. Indicate bending diagrams, assembly diagrams, splicing and laps of bars and shapes, dimensions and details of bar reinforcing and assemblies. Correctness of all reinforcing requirements and work is the responsibility of Contractor. Identify such shop drawings with reference thereon to sheet and detail numbers from Contract Drawings.
 - 1) Do not use scaled dimensions from Contract Drawings in determining the lengths of reinforcing bars.
 - 2) No reinforcing steel shall be fabricated without approved shop drawings.
 - 3) One of the required submittal copies shall be reproducible transparency.
 - 4) Any deviations from the contract documents must be clearly indicated as a deviation on the shop drawings.

- 5) Areas of high congestion, including member joints and embed locations shall be fully detailed to verify clearances and assembly parameters and coordination with other trades.
- c. Certificates of Compliance with specified standards:
 - 1) Reinforcing Bars.
 - 2) Welded wire fabric.
 - 3) Welding electrodes.
- 3. Samples
 - a. Only as requested by Architect.
- 4. Quality Assurance/Control Submittals:
 - a. Test Reports Testing Laboratory shall submit to DSA/SSS, Project Inspector, Architect, Structural Engineer and the Contractor one (1) copy of each report showing results of test.
 - Certified mill test reports of supplied reinforcing indicating chemical and physical analysis. Tensile and bend tests shall be performed by the mill in accordance with ASTM A 615 "Specification for Deformed and Plain Carbon-Steel Bars for Structural Concrete."
 - Testing Laboratory reinforcement tests in accordance with CBC Table
 1705A.2.1, CBC Section 1910A, and the provisions of Specification Section
 TESTING LABORATORY SERVICES.
 - 3) Owner will pay for tests of samples taken from identified bundles accompanied by mill analysis.
 - b. Certificates of Compliance with specified standards:
 - 1) Reinforcing bars.
 - 2) Welded wire fabric.
 - 3) Welding electrodes.
 - 4) Welder's Certification.
- 5. Closeout Submittals:
 - a. Project Record Documents in accordance with Specification Section PROJECT DOCUMENTS.
 - b. Warranty.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications:
 - a. Installation shall be done only by an installation firm normally engaged in this business. All work shall be performed by qualified mechanics working under an experienced supervisor.
 - 2. Welding Qualifications:
 - a. Welding procedures, welding operators and welders shall be qualified in accordance with AWS D1.4 "Structural Welding Code Reinforcing Steel".
 - b. Welders shall be recently qualified by Test as prescribed in AWS "Standard Qualifications Procedure."
 - 1) Welders whose work fails to pass inspection shall be re-qualified before performing further welding.
 - 3. Manufacturer/Supplier Qualifications:
 - a. Acceptable Manufacturers/Suppliers shall be regularly engaged in the manufacture of steel bar and wire fabric reinforcing.
 - 4. Testing Laboratory will be approved by DSA/SSS, and selected by the Architect and the Owner.
- B. Regulatory Requirements:

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

2. General:

a. Reinforcement work shall conform to ACI 301 "Specifications for Structural Concrete for Buildings," and CBC Section 1905A as minimum standards.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 - 1. Deliver reinforcement to Project plainly tagged, completely fabricated and ready to set.
- B. Storage and protection:
 - 1. Store reinforcement above the ground surface on platforms, skids or other supports, protected from dirt, rust, or other substances which will prevent bonding to the concrete.
 - 2. Use all necessary care to maintain identification after bundles are taken apart.

1.6 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period: One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES.
 - a. Warranty Period: One (1) Year.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Deformed Bars: In accordance with ASTM A 706 "Low Alloy Steel Deformed Bars for Concrete Reinforcement" and ASTM A 615 "Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement," Grade as indicated on the structural drawings.
- B. Tie Wire: In accordance with ASTM A 82 "Cold Drawn Wire for Concrete Reinforcement," plain, cold-drawn steel.
- C. Welded Wire Fabric: In accordance with ASTM A 1064 "Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete".
- D. Steel Dowels: Same grade as bars to which dowels are connected.

2.2 ACCESSORIES

- A. Supports for Reinforcement: Provide bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening, deformed bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI specifications.
 - 1. Supports and spacing of spacers per standards set forth by CRSI/WCRSI Manual of Standard Practice.
 - 2. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
 - 3. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs that are protected by plastic color to match adjacent concrete surfaces in accordance with CRSI Class I, or stainless steel in accordance with CRSI, Class II.
- B. Welding Electrodes: As per AWS D1.4 "Structural Welding Code for Reinforcing Steel".
- C. Mechanical Couplers: Mechanical Couplers shall develop 125 percent of the specified yield strength of the bars, and shall comply with ACI 318 "Building Code Requirements for Structural Concrete and Commentary", Section 12.14.3.

2.3 FABRICATION

- A. Bending: In accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary", except as modified by CBC Sections 1905A.
 - 1. Fabricate reinforcement in accordance with the requirements of ACI 315 "Details and Detailing of Concrete Reinforcement", where specific details are not shown.
 - 2. Inside diameter of bends for stirrups and ties shall not be less than 1-1/2 inches for No. 3 bars, 2 inches for No. 4 bars and 2-1/2 inches for No. 5 bars.
 - 3. Where bent bars are straightened: field bending of bars will only be done in accordance with DSA/SSS approval per ACI 318 "Building Code Requirements for Structural Concrete and Commentary", Section 7.3.2. Steel reinforcement shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown on the drawings shall not be used. Heating of bars will not be permitted.
 - 4. Provide offsets in rebar (1:6 maximum) where required to maintain clearances.

B. Allowable Tolerances:

- 1. Fabrication:
 - a. Sheared length: 1 inch.
 - b. Depth of truss bars: Plus 0., minus 1/2 inch.
 - c. Ties: Plus or minus 1/2 inch.
 - d. All other bends: Plus or minus 1 inch.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Placing:
 - 1. Place Reinforcement accurately.
 - 2. Do not move bars beyond allowable without concurrence of the Architect.
 - 3. Do not heat, bend, or cut bars without concurrence of the Architect.

- 4. Reinforcement shall not be bent after being embedded in hardened concrete.
- 5. Tie Reinforcement together at all intersections with Tie Wire.
- 6. Support Reinforcing Bars by bar supports. Place and secure in accordance with CRSI "Specifications for Placing Bar Supports".
- 7. Placement and support shall be complete.
- 8. Do not use Reinforcing Bars with kinks or bends except when detailed on the structural drawings.
- 9. Architect shall approve placement and support before concrete is deposited.
- 10. Spiral reinforcing shall comply with ACI 318 "Building Code Requirements for Structural Concrete and Commentary".

B. Spacing:

1. Clear space between parallel Reinforcing Bars shall not be less than 1 bar diameter nor less than 1 inch, unless otherwise noted on drawings.

C. Splicing:

- 1. At splices, lap Reinforcing Bars 53 diameters minimum, unless otherwise indicated on Drawings.
 - a. Lap Splices: Tie securely with wire to prevent displacement of splices during placement of concrete.
 - b. Splice Devices: Install in accordance with manufacturer's written instructions.
 - 1) Obtain the Architect's review before using.
 - c. Do not splice bars except at locations shown without the concurrence of the Architect.
 - 1) Where splices in addition to those indicated are required, indicate location on shop drawings clearly and highlight "for the Architect's approval".
- 2. Stagger splices as indicated on drawings. Splice locations shall be as shown on drawings or shall be approved by Architect and DSA/SSS.
 - a. Near floors.
 - b. Ductile concrete columns must splice at the centerline of the column height.
 - c. As detailed on the drawings.
- 3. Where vertical Reinforcing Bars are offset at a splice, the slope of the inclined portion of bar with the axis of the column or wall shall not exceed 1 in 6.
- 4. Welded Wire Fabric:
 - a. Install in long lengths, lapping 24 inches at end splices and one mesh at side splices.
 - b. Offset laps in adjacent widths.
 - c. Place fabric in approximately the middle of the slab thickness unless otherwise shown on the drawings.
 - d. Wire tie lap joints at 12 inch centers.
 - e. Use concrete blocks to support mesh in proper position.
- 5. Mechanical bar splices shall be approved by the Architect and DSA/SSS.

D. Welding:

- 1. Welding is not permitted unless specifically detailed on Drawings or approved by the Architect.
- 2. Weld under supervision of qualified Testing Laboratory selected by Owner. Cost of supervision to be paid by the Owner. Weld only ASTM A 706 "Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement," unless otherwise noted.
- 3. Employ shielding metal-arc method and meet requirements of AWS D1.4 "Structural Welding Code for Reinforcing Steel."
- 4. Welding is not permitted on bars where carbon equivalent is unknown or is determined to exceed 0.55.

- 5. Welding shall not be done within two bar diameters of any bent portion of a bar which has been bent cold.
- 6. Welding of crossing bars is not permitted.
- 7. Provide material properties supplemental report for bars other than ASTM A706 "Low Alloy Steel Deformed Bars for Concrete Reinforcement".
- 8. Weld in accordance with AWS D1.4 "Structural Welding Code for Reinforcing Steel".
 - a. Weld only where indicated on the drawings.
 - Weld only ASTM A 615 "Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement", unless otherwise approved by the Architect and DSA/SSS.
- 9. Inspection provided per CBC Table 1705A.3.

E. Allowable Tolerances:

- 1. Placement:
 - a. Concrete cover to form surfaces: Plus or minus 1/4 inch.
 - b. Minimum spacing between bars: Plus or minus 1/4 inch.
 - c. Crosswise of members: Spaced evenly with 2 inches of stated separation.
 - d. Lengthwise of members: Plus or minus 2 inches.
- 2. Maximum bar movement to avoid interference with other reinforcing steel, conduits, or embedded items: 2 bar diameters.
- F. Drawing Notes: Refer to notes on drawings for additional reinforcement requirements.
- G. Mechanical, Electrical and Plumbing Drawings:
 - 1. Refer to Mechanical, Electrical and Plumbing drawings for formed concrete requiring reinforcing steel.
 - 2. All such steel shall be included under the work of this section.

3.2 CONSTRUCTION

A. Corrective Measures:

- 1. Notify Architect if conduit, piping, inserts, sleeves, etc. interfere with placement of Concrete Reinforcement as indicated on Drawings. Notify Architect immediately if any Concrete Reinforcement is found to be misplaced after concrete has been poured.
- 2. Do not cut, bend, kink or hickey misplaced reinforcement.
- 3. Make corrections only as directed by Architect and approved by DSA/SSS.
- 4. This Contractor shall bear the cost of any alteration, corrections or replacements of Concrete Reinforcing to concrete required because of misplaced reinforcement.

3.3 FIELD AND QUALITY CONTROL

A. Site Tests:

- 1. When inspections are indicated for reinforcement placement on the Structural drawings, a special inspector shall be employed to inspect reinforcing placement per CBC Table 1705A.3.
- Inspect shop and field welding in accordance with AWS D1.4 "Structural Welding Code
 for Reinforcing Steel", including checking materials, equipment, procedure and welder
 qualifications as well as the welds. Inspector will use non-destructive testing or any
 other aid to visual inspection that he deems necessary to assure himself of the adequacy
 of the weld.

B. Inspections:

- 1. All reinforcing steel whose properties are not identifiable by mill test reports shall be tested in accordance with ASTM A 706 "Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement". One series of tests shall be performed for each missing report. Contractor shall pay for test required due to lack of positive identification, by means of a back charge by the Owner.
- 2. When tests are indicated for reinforcing steel on the structural drawings, the reinforcing steel used shall be tested in accordance with ASTM A 615 "Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement". One tensile and one bend test for each 2-1/2 tons of steel or fraction thereof, shall be made.
- C. Tests and Inspection shall be performed by Owner's Testing Laboratory except when needed to justify rejected work, in which case the cost of re-tests and re-inspection shall be borne by the Contractor.

3.4 CLEANING

A. Reinforcement, at time concrete is placed, shall be free of loose rust scale, mud, oil or other coating that will destroy or reduce the bond.

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Cast-In-Place Concrete materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - a. Footings.
 - b. Foundation Walls.
 - c. Slab on Grade.
 - d. Slab on Metal Deck.
 - e. Building Walls.
 - f. Site Improvements.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 11 01 CONCRETE FORMWORK
 - 4. 03 15 14 DRILLED ANCHORS
 - 5. 03 20 00 REINFORCEMENT
 - 6. 03 35 00 POLISHED CONCRETE FINISHING
 - 7. 05 12 00 STEEL AND FABRICATIONS
 - 8. 06 10 00 ROUGH CARPENTRY
 - 9. 07 92 00 SEALANTS
 - 10. 09 30 00 TILE
 - 11. 09 65 10 RESILIENT BASE AND ACCESSORIES
 - 12. 09 67 23 RESINOUS FLOORING
 - 13. 10 05 00 MISCELLANEOUS SPECIALTIES
 - 14. 10 14 00 IDENTIFYING DEVICES
 - 15. 10 51 13 METAL LOCKERS
 - 16. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

- 1. In accordance with the following standards:
 - a. ACI American Concrete Institute
 - b. ASTM American Society of Testing Materials.
 - c. RFCI The Resilient Floor Covering Institute
 - d. RIS Redwood Inspection Service
 - e. RMAI Rubber Manufacturers Association Inc.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Make ready all interior concrete substrates to receive flooring:

- a. Ensure the proper levelness and flatness of all concrete substrates for the intended flooring products.
 - 1) If leveling materials are required because of inadequate leveling during the pour and curing periods, follow all manufacturers written instructions for the proper preparation and application of these products.
 - 2) Verify that the concrete substrates are at the right RH (Relative Humidity) and Alkalinity Levels for the leveling materials in accordance with manufacturers written instructions.
- b. Keep finished concrete substrates clean and ready for scheduled flooring applications during the construction process.
 - 1) Protect those substrates from excessive moisture build-up, and keep free of moisture puddles.
 - 2) Ensure that construction equipment does not leak fluids on substrates that would prevent bonding of flooring adhesives at the proper time for flooring installations.
- c. Provide concrete substrates that are within acceptable limits of RH and that the Alkalinity of the concrete substrates are within the acceptable levels for adhesively applied flooring at the scheduled time for flooring installations.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Coordination Drawings:
 - a. Layout drawings for construction, control and expansion joints.
 - 1) Coordinate joints with floor patterns.
 - 2. Product Data.
 - a. Submit data on all products listed under MATERIALS, and ACCESSORIES within this specification section.
 - 3. Quality Assurance/Control Submittals:
 - a. Coordinate with Specification Section TESTING LABORATORY SERVICES for additional Testing Requirements as required by DSA.
 - b. Material samples and mix designs:
 - 1) Material samples and mix designs as required for testing shall be submitted to Architect at least fourteen (14) days prior to any concrete work and shall include results of test data used to establish proportions.
 - a) Grout samples and colors for colored surfaces upon Architect's request only.
 - c. Continuous batch plant inspection required per CBC Section 1705A.3.3, or may be waived per CBC Section 1705A.3.3.2.
 - d. Continuous Batch Plant Inspection is waived for this project in compliance with CBC Section 1705A.3.3.2, subject to the following requirements:
 - The concrete plan complies fully with the requirements of ASTM C94, Sections 9 and 10, and has a current certificate from the National Ready Mixed Concrete Association or another agency acceptable to the DSA. The certification shall indicate that the plant has automatic batching and recording capabilities.
 - 2) A licensed Weighmaster shall positively identify the quantity of materials and certify each load with a batch ticket.

3) Batch tickets shall accompany the load and be transmitted to the Inspector of Record by the truck driver with the load identifies thereon. The load shall not be placed without a batch ticket identifying the mix. The Inspector of Record shall keep a daily record of placements, identifying each truck, its load, and the time of receipt at the jobsite, and approximate location of deposit in the structure. A copy of the daily record shall be maintained.

e. Test Reports:

- 1) Testing Laboratory shall submit to Architect, Structural Engineer, Owner, and to the DSA one (1) copy of each report showing results of tests.
 - a) Report shall state whether materials were in conformance with specifications.
 - b) Report shall state whether the curing of the concrete slabs are within parameters required for future flooring installations.
- 2) Moisture and Alkalinity Tests.
 - a) Relative Humidity (RH).
 - b) Moisture Vapor Emission Report (MVER).

f. Certificates:

- 1) Submit three (3) copies of certificates.
 - a) Provide Vapor Retarder manufacturer's certificate of inspection and compliance to installation procedures.
 - b) Cement manufacturer's Mill Certificate of Compliance with the specification.
 - c) Certificates for aggregates and admixtures.

4. Closeout Submittals:

- a. Project Record Documents in accordance with Specification Section PROJECT DOCUMENTS.
- b. Warranty.

1.5 QUALITY ASSURANCE

A. Qualifications:

- 1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
- 2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the Work.
- 3. Testing Laboratory Qualifications:
 - a. Qualified Testing Laboratory and personnel approved by DSA.
 - 1) Cost of testing and inspection will be paid by the Owner unless otherwise specified. The Owner shall pay all costs of re-inspection and/or re-tests due to non-compliance with specifications and/or failures, but the Contractor shall reimburse the Owner for these tests when billed or deducted from its payment.

B. Regulatory Requirements:

- 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. All materials, equipment and placing operations shall be subject to inspection, tests and approval at all items. Testing Agent shall have free and unhampered access to all places where concrete materials are stored proportioned and mixed.

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

C. Mockups:

- 1. Provide mockups prior to application of work and prior to installation of any materials.
- 2. Mockups shall be used for establishing construction sequences, installation requirements of materials, and shall be representative for the intended end-use configuration.
- 3. Mockup Assemblies:
 - Slab on Metal Deck Mockups shall be placement of concrete and shall integrate all other related work, including, but not limited to, Specification Section -REINFORCEMENT.
 - 1) Mockups shall be a minimum overall size of 10'-0" x 8'-0" by thickness required.
 - 2) Placement of concrete shall not displace the reinforcing as to proper height with chairs, tying of reinforcement, and location of reinforcement with relationship to Metal Deck Flutes.
 - b. Polished Concrete Finishing: Mockups shall be the placement of concrete and shall integrate all other related work, but not limited to, Specification Section POLISHED CONCRETE FINISHING.
 - c. Slab-On-Grade: Mockups shall be the finish and texture of concrete.
 - 1) Mockups shall be a minimum overall size of 3' x 3' x 4" thick panels.
 - 2) Provide Mockups for each texture and finish required.

4. Installation of Mockups:

- a. The Project Inspector, the Architect, and Contractor's Superintendent shall observe the installation of materials and work.
- b. Installation crew for the Mockups shall be the Cast-In-Place Concrete, Reinforcement and Polished Concrete Finishing installers for this project and installers, as necessary, of other related work.
- c. Unacceptable Mockups shall be removed and reinstalled until the work is deemed to be in compliance with the project requirements and is acceptable by the Owner, Architect and Project Inspector.
- 5. Allow 24 hours for inspection of mockup before proceeding with work.
- 6. Protect the Mockups during the course of construction.
- 7. Remove mockup and dispose of materials when no longer required and when directed by the Architect at the end of the project.

D. Meetings:

- 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other related work being performed.
 - 1) Schedule pre-construction conference with Vapor Retarder Manufacturer prior to installation at least one week prior to scheduled installation.
 - 2) Schedule pre-construction conference with Polished Concrete Contractor prior to installation to discuss specific requirements of the Polished Concrete Finishing requirements. Coordinate with Specification Section -POLISHED CONCRETE FINISHING.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 - c. Prior to submitting design mixes, review detailed requirements for preparing concrete design mixes and determine procedures for satisfactory concrete operations.
 - d. Review requirements for submittals, status of coordinating work, and availability of materials.

- e. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - 1) Schedule installation review at the start of installation with the Vapor Retarder Manufacturer to ensure all of the manufacturers written instructions are complied with.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - Prior to covering up the Vapor Retarder installation with concrete, have the Vapor Retarder manufacturer inspect and provide a certified report to the Architect the condition of the Vapor Retarder prior to being covered with concrete, and that the installation was in full compliance with the manufacturer's written instructions.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 PROJECT CONDITIONS

- A. Environmental requirements:
 - 1. Cold Weather Requirements:
 - a. Do not pour concrete unless air temperature is at least 40 degrees Fahrenheit and rising.
 - b. Do not pour concrete on frozen ground or ice.
 - c. Heat and otherwise prepare materials in accordance with ACI Standard 306.
 - d. Maintain concrete temperature at 50 degrees Fahrenheit (minimum) the first three (3) days after pouring. Protect concrete from freezing the first six (6) six days, after placing.
 - 2. Hot Weather Requirements:
 - a. Do not pour when temperature exceeds 90 degrees Fahrenheit.
 - b. During hot weather, proper attention shall be given to ingredients, production methods, handling, placing, protection, and curing to prevent excessive Concrete temperatures or water evaporation, which will impair the required strength or serviceability of the member or structure.

1.7 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period: One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES
 - a. Warranty period: One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Cement:
 - a. Natural (Grey) Portland Cement:
 - 1) LEHIGH PORTLAND CEMENT COMPANY.
 - 2) TXI CEMENT COMPANY (formerly RIVERSIDE WHITE CEMENT).
 - b. White Cement:
 - 1) LEHIGH WHITE CEMENT
 - 2) TXI CEMENT COMPANY (formerly RIVERSIDE WHITE CEMENT).
 - 2. Admixtures:
 - a. Water Reducing, High Range:
 - 1) W.R. GRACE CONSTRUCTION PRODUCTS.
 - b. Fiber Reinforcing
 - 1) Specified product manufacturer: EUCLID.
 - a) TUF-STRAND SF.
 - c. Integrally Colored Concrete Color Pigment:
 - 1) Specified product manufacturer: DAVIS COLORS.
 - 2) Acceptable alternative product manufacturers:
 - a) SOLOMON COLORS.
 - d. Shrinkage Control:
 - 1) Specified product manufacturer: SIKA CONTROL-40.
 - 2) Acceptable alternative product manufacturer:
 - a) EUCLID: "Eurcon SRA Floor".
 - e. Integral Concrete Waterproofing:
 - 1) Specified product manufacturer: XYPEX.
 - a) ADMIX C-500.
 - 3. Vapor Retarders:
 - a. Specified product manufacturer: STEGO INDUSTRIES.
 - 1) "Stego-Wrap" ("Yellow" color).
 - b. Acceptable alternative product manufacturers:
 - 1) EPRO SERVICES, INC.: "Ecoshield-E15" ("Red" color).
 - 2) W.R. MEADOWS: "Perminator 15" ("Green" color).
 - 4. Bonding Agents:
 - a. Specified product manufacturer: CONRAD SOVIG CO., INC.
 - 1) "Cemlok-NE."
 - b. Acceptable alternative product manufacturers:
 - 1) THE EUCLID CHEMICAL COMPANY: "Eucoweld."
 - 2) LARSON PRODUCTS CORPORATION: "Weld-Crete."
 - 3) SONNEBORN: "Sonobond."
 - 4) W.R. GRACE CONSTRUCTION PRODUCTS: "Darweld C."
 - 5) W.R. MEADOWS: "Deck-O-Weld."

- 5. Epoxy Adhesives and Mortar Materials:
 - a. Specified product manufacturer: W.R. MEADOWS.
 - 1) "Rezi-Weld," "LV, 1000" or "Gel-Paste" as suitable for application.
 - Acceptable alternative product manufacturers:
 - 1) THE EUCLID CHEMICAL COMPANY: "Euco #456."
- 6. Epoxy Concrete Mortar:
 - a. Specified product manufacturer:
 - 1) GENERAL POLYMER CORPORATION: "TPM 115."
 - b. Acceptable alternative product manufacturers:
 - 1) ANTI-HYDRO CORPORATION: "A-H Emery Epoxy Topping #170."
- 7. Concrete Mortar:

b.

- a. Specified product manufacturer:
 - 1) THE EUCLID CHEMICAL COMPANY: "Euco."
- b. Acceptable alternative product manufacturers:
 - 1) MASTER BUILDERS: "Embeco 411-A."
- 8. Non-Shrink Grout:
 - a. Specified product manufacturer:
 - 1) MINWAX CONSTRUCTION PRODUCTS COMPANY
 - a) "POR-ROK", Epoxy Grout.
 - b. Acceptable alternative product manufacturers:
 - 1) MASTER BUILDERS: "713."
 - 2) MASTER BUILDERS: "928."
- 9. Drypack Grout Materials:
 - a. Specified product manufacturer:
 - 1) THE EUCLID CHEMICAL COMPANY: "Euco Dry Pack Grout."
 - Acceptable alternative product manufacturers:
 - 1) W.R. MEADOWS: "Pac-It Grout."
- 10. Waterstops:

b.

- a. Specified product manufacturer:
 - 1) GREENSTREAK PLASTIC PRODUCTS COMPANY.
 - a) Polyvinyl Chloride Type.
- 11. Fiber Expansion Joint Filler:
 - a. Specified product manufacturer:
 - 1) W.R. MEADOWS: "Sealtight Fiber Expansion Joint Filler."
 - b. Acceptable alternative product manufacturer:
 - 1) CELOTEX CORP.: "Flexcell."
 - 2) PHILLIP CAREY MFG. CO.: "Elastic Fiber Expansion Joint."
- 12. Semi-Rigid Joint Filler:
 - a. Specified product manufacturer:
 - 1) W.R. MEADOWS: "Rezi-Weld Flex."
- 13. Polished Concrete Joint Filler:
 - a. Specified product manufacturer: EUCLID "Euco 700."
- 14. Foam Expansion Joint Filler:
 - a. Specified Product Manufacturer:
 - 1) DOW CHEMICAL CORP.: "Styrofoam."
 - b. Acceptable alternative product manufacturers:
 - 1) U.C. INDUSTRIES: "Foamular."
- 15. Curing Paper:
 - a. Specified product manufacturer:
 - 1) FORTIFIBER CORPORATION: "Orange Label Sisalkraft."
- 16. Slab Curing Compound (SCC):
 - a. Specified product manufacturer:

- 1) THE EUCLID CHEMICAL COMPANY: "Cure-Crete WB."
- b. Acceptable alternative product manufacturers:
 - 1) W.R. MEADOWS: "Sealtight 1100 CLEAR."
- 17. Clear Floor Sealer (CFS):
 - a. Specified product manufacturer:
 - THE EUCLID CHEMICAL COMPANY: "Diamond Clear VOX."
 - b. Acceptable alternative product manufacturers:
 - 1) W.R. MEADOWS: "Sealtight VOComp 25."
- 18. Clear Floor Hardener CFH):
 - a. Specified product manufacturer:
 - L.M. SCHOFIELD COMPANY: "Emerchrome Clear Floor Hardener."
- 19. Colored Floor Hardener (COFH):
 - a. Specified product manufacturer:
 - 1) L.M. SCHOFIELD COMPANY: "Lithochrome Color Hardener" and "Lithochrome Color Sealer."
- 20. "Colored Wear-Resistant" Finish (COWR):
 - a. Specified product manufacturer:
 - 1) L.M. SCHOFIELD COMPANY: "Emerchrome Colored Floor Hardener" and "Colorcure Sealer."
- 21. Cementitious Based Underlayment Compound (CBUC):
 - a. Specified product manufacturer:
 - 1) ARDEX: "V-1200."
 - b. Acceptable alternative product manufacturers:
 - 1) MAPEI: "Ultraflex."
 - 2) QUIKRETE PRODUCTS CORP.: "QUIKRETE No. 1249."
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Concrete:
 - Cement: Type I or II in accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary," Chapter 3, and ASTM C 150 "Specifications for Portland Cement."
 - a. Provide white cement for mixing when the Project requires patching for defective work, to match adjacent material color. See Specification Section CAST-IN-PLACE CONCRETE, Part 3 Article titled "APPLICATIONS," the paragraph titled "Sack Finish."
 - 2. Water: Clean and free from deleterious amounts of acids, alkalis, salts, organic material, or other substances that may be deleterious to concrete or reinforcing.
 - 3. Aggregates:
 - a. Normal weight aggregates in accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary," Chapter 3 and ASTM C33 "Standard Specifications for Concrete Aggregates." Crushed Granite or "Perkins" type aggregates are acceptable materials.
 - 1) Maximum Aggregate Size: 1-1/2 inches for standard aggregate.
 - 2) Coarse aggregate when tested in accordance with State of California Highways Test Methods 227 shall have a cleanliness value of 75 minimum.
 - 3) Fine aggregates when tested in accordance with State of California Highways Test Methods 217 shall have a sand equivalent of 75 minimum.

- 4. Admixtures: Admixtures shall be in accordance with the provisions of ACI 318 "Building Code Requirements for Structural Concrete and Commentary," Section 3.6, and shall not be used until prior approval from DSA has been obtained. Calcium Chloride is not permitted.
 - a. Air Entraining:
 - Conform to ASTM C 260 "Specifications for Air-Entraining Admixtures for Concrete."
 - b. Fly Ash (Not to exceed 15 percent of the total cementitious material per DSA:
 - 1) Conform to ASTM C 618 "Specification for Coal Fly Ash and Raw or Calcined Natural Possolan for Use in Concrete."
 - 2) Class "C" Fly Ash is not permitted per CBC 1903A.6.
 - c. Water Reducing, High Range: On approval of DSA, the Architect and the Structural Engineer, the Contractor may use a High Range Water Reducing Admixture complying with ASTM C 494 "Specification for Chemical Admixtures for Concrete." Use one of the following materials:
 - 1) Finish Enhancing Water Reducer; "ADVA 170" by GRACE Construction Products, or approved equivalent.
 - a) ASTM C 494 "Specification for Chemical Admixtures for Concrete," Type F.
 - d. Fiber Reinforcing:
 - Polypropylene / polyethylene macro synthetic fiber, complying with ASTM C 1116 "Standard Specification for Fiber Reinfroced Concrete and Shotcrete."
 - 2) Suitable for Slab On Grade and Above Grade Slab Construction.
 - 3) UL Certified for composite metal deck construction.
 - e. Integrally Colored Concrete Color Pigment:
 - 1) ASTM C 979 "Specification for Pigments for Integrally Colored Concrete," synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
 - f. Shrinkage Control:
 - 1) Conform to ASTM C 494 "Specification for Chemical Admixtures for Concrete," Type S.
 - 2) Verify and provide Shrinkage control compatible with Polished Concrete Finishing.
 - g. Integral Concrete Waterproofing:
 - 1) Crystalline Waterproofing: Prepackaged, gray-colored proprietary blend of portland cement, specially treated sand, and active chemicals that, when mixed with water and applied, penetrates into concrete and reacts chemically with the byproducts of cement hydration in the presence of water to develop crystalline growth within substrate capillaries to produce an impervious, dense, waterproof substrate.
- B. Rock Base:
 - 1. Clean mixture of crushed stone or uncrushed gravel, in accordance with ASTM D 448 "Standard Classification for Sizes of Aggregate for Road and Bridge Construction."
 - a. Top Layer:

Percent passing a 1-inch sieve: 100 percent.
 Percent passing No. 8 sieve: 0 to 5 percent.

b. Bottom Layer:

Percent passing a 2-inch sieve: 100 percent.
 Percent passing No. 8 sieve: 0 to 5 percent.

C. Sand Base:

- 1. Sand to be washed and of natural siliceous or igneous origin, having hard, strong, and durable particles.
- 2. Sand shall comply with ASTM C 33 "Specification for Concrete Aggregates," generally as follows:

a. Percent passing 3/8 inch sieve: 100 percent.
b. Percent passing No. 4 sieve: 95 to 100percent.
c. Percent passing No. 50 sieve: 10 to 30 percent.
d. Percent passing No. 100 sieve: 2 to 10 percent.

D. Vapor Retarder:

- 1. Vapor Retarder: Physical Requirements in accordance with ASTM E 1745 "Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs," Class A Material, are as follows:
 - a. Thickness: 15 mils minimum.
 - b. Permeance: 0.01 Perms.
 - Maintain permeance of less than 0.01 perms after mandatory conditioning tests per ASTM E 154 "Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover," Sections 8, 11, 12, and 13.
 - c. Tensile Strength: 45.0 lbf/in.
 - Per ASTM E 154 "Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover," Sec. 9, ASTM D 828 "Standard Test Method for Tensile Properties of Paper and Paperboard Using Constant-Rate-of-Elongation Apparatus:"
 - d. Resistance to Puncture: 2200 grams.
 - 1) ASTM E 154 "Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover", Sec. 10, ASTM D 1709 "Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method:"
 - e. Resistance to decay:
 - Per ASTM E 154 "Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover."
 - f. Use pressure sensitive seam tape compatible with materials to be seamed in accordance with manufacturer's written recommendations.
 - 1) Water vapor Transmission Rate: 0.3 perms or lower.
 - a) Per ASTM E 96 "Test Methods for Water Transmission of Materials."
 - g. Vapor Proof Mastic: 0.3 perms or lower.
 - 1) Water vapor Transmission Rate: 0.3 perms or lower.
 - a) Per ASTM E 96 "Test Methods for Water Transmission of Materials."
 - h. Pipe Boots: Construct pipe boots from vapor retarder material, pressure sensitive seam tape, and /or mastic per manufacturer's written instructions.
 - i. Vapor Stakes:
 - 1) Density: 0.0289 lb/cu.in.
 - a) Per ASTM D 1505 "Test Method for Density of Plastics by the Density-Gradient Technique."
 - 2) Specific Gravity: 0.0477.
 - a) Per ASTM D 792 "Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement."

2.3 ACCESSORIES

A. Bonding Agents: Polyvinyl acetate or acrylic base, mixed in accordance with the manufacturer's written recommendations.

B. Mortar:

- 1. Site Mix:
 - Composed of Concrete Materials indicated in Specification Section -CAST-IN-PLACE CONCRETE, Part 2 Article titled "MATERIALS."
 - 1) Mix: One part cement to 3 parts aggregate (all aggregate shall pass No. 4 sieve).
 - 2) Mixing: Thoroughly mixed in accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary."
- 2. Concrete Mortar:
 - a. Greater than 1/4 inch thick: Floor leveling, patching and repair, non-shrink trowel applied concrete mortar where repair areas of fill.
- 3. Epoxy Concrete Mortar:
 - a. Less than 1/4 inch thick: Floor leveling, non-shrink trowel applied epoxy concrete mortar where repair areas to fill.
- 4. Epoxy Mortar and Adhesive Materials:
 - a. Modified Polyamide, high modulus mortar, strength to match adjacent concrete or greater, in accordance with ASTM C 881 "Specification for Epoxy-Resin-Base Bonding Systems for Concrete," Grade 1, Type III, Class B & C, and in accordance with ACI 503.4, mixed in accordance with the manufacturer's written recommendations.

C. Grout:

- Strength to match adjacent concrete or greater, composed of Concrete Materials indicated in Specification Section - CAST-IN-PLACE CONCRETE, Part 2 Article titled "MATERIALS."
 - a. Mix: Same proportions as concrete mix except omit coarse aggregate and adjust water to produce a thick consistency. Provide mix design per CBC Section 1904A 2
 - b. Mixing: In accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary," mixed in accordance with the manufacturer's written recommendation.
- 2. Non-Shrink Grout: Flowable, non-shrink, self-leveling, non-staining, non-metallic grout, strength to match adjacent concrete or greater, and in compliance with ASTM C 1107 "Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)," mixed in accordance with the manufacturer's written recommendation.
- 3. Drypack Grout: Non-staining, non-shrink, non-metallic grout, strength to match adjacent concrete or greater, and in accordance with ASTM C 1107 "Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)," mixed in accordance with the manufacturer's written recommendation.
- D. Waterstops: Provide polyvinyl chloride type waterstops, model number and size to fit the construction required, in accordance with the Corps of Engineers standard CRD-C 572.
- E. Fiber Expansion Joint Filler: 1/4" thick at vertical joints and 1/2" thick under thresholds (unless specifically noted otherwise), asphalt saturated fiber expansion joint filler, in accordance with ASTM D 1751 "Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)."
- F. Semi-Rigid Joint Filler: Two-component, semi-rigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240 "Standard Test Method for Rubber Property Durometer Hardness."

- G. Polished Concrete Joint Filler: A two-component, 100% solids semi-rigid epoxy for filling control and construction joints in industrial concrete floors. This product supports the joint edges and reduces spalling of the edges caused by wheel traffic. EUCO 700 has been designed for use in compliance with ACI 302 recommendations for epoxy joint fillers used in control and construction joints.
- H. Foam Expansion Joint Filler: Extruded Polystyrene Foam products, in accordance with ASTM C 578 "Specification for Rigid, Cellular Polystyrene Thermal Insulation," thickness and depth as indicated on the drawings.
- I. Redwood Joint Filler:
 - 1. Selected sound heart redwood in accordance with RIS "Standard Specifications for Grades of California Redwood Lumber," Section 211 (c) and Section 306.
- J. Curing Paper (Absorptive Covers): Products complying with:
 - 1. ASTM C 171 "Specification for Sheet materials for Curing Concrete."
- K. Slab Curing Compound (SCC): Provide liquid-type membrane-forming sealing compound, non-yellowing, VOC compliant cure and seal, complying with ASTM C 309 "Specification for Liquid Membrane-Forming Compounds for Curing Concrete," Type I, Class A, that when dry is clear in color. Moisture loss not more than 0.55 kg/sq. meter when applied at 200 sq.ft./gal.
- L. Clear Floor Sealer (CFS): Provide liquid-type membrane-forming sealing compound, non-yellowing, VOC compliant cure and seal, complying with ASTM C 309 "Specification for Liquid Membrane-Forming Compounds for Curing Concrete," Type I, Class A, that when dry is clear in color. Moisture loss not more than 0.55 kg/sq. meter when applied at 200 sq.ft./gal.
- M. Clear Floor Hardener (CFH): Provide products that are ready-to-use, dry-shake type, VOC compliant clear hardeners, with surface conditioning and dispersing agents, portland cement blended with hard, graded aggregate, mixed in accordance with the manufacturer's written recommendations.
- N. Colored Floor Hardener (COFH): Provide products that are ready-to-use, dry-shake type, VOC compliant colored hardeners, with surface conditioning and dispersing agents, portland cement blended with hard, graded aggregate, mixed in accordance with the manufacturer's written recommendations.
- O. Colored Wear-Resistant Finish (COWR): Provide products that are ready-to-use, dry-shake type, VOC compliant colored hardeners, streak-free integrinds of pigments, with surface conditioning and dispersing agents, portland cement blended with hard, graded aggregate, mixed in accordance with the manufacturer's written recommendations, and then apply a Colored Curing Compound Sealer mixed in accordance with manufacturers recommendations:
 - 1. Provide Manufacturer's Color Hardener.
 - 2. Provide manufacturer's colored curing compound sealer.
 - a. Provide liquid-type membrane-forming sealing compound, VOC compliant cure and seal, complying with ASTM C 309 "Specification for Liquid Membrane-Forming Compounds for Curing Concrete," Type I, Class A, that when dry has the color as selected by the Architect from the manufacturer's full color range. Moisture loss not more than 0.55 kg/sq. meter when applied at 200 sq.ft./gal, mixed in accordance with the manufacturer's written recommendations:
- P. Sack Finish Materials: For repair and patching of defective areas.

- 1. Provide sack finish materials composed of Concrete Materials indicated in Specification Section CAST-IN-PLACE CONCRETE, Part 2 Article titled "MATERIALS." Sand shall be fine.
- 2. Mix: One part cement to one part fine sand with enough water to provide a creamy consistency.
- Q. Cementitious Based Underlayment Compounds (CBUC): Provide free-flowing, self-leveling, pumpable, cement based compound for applications from 1-1/4 inch thick to feathered edges, 4500 psi minimum in accordance with ASTM C 109 "Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. (or 50-mm) Cube Specimens)."

2.4 MIXES

- A. Mix Design and Proportions in accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary:"
 - 1. Initial mix design shall be prepared for all concrete by recognizing testing laboratory (approved by Architect). In the event that additional mix designs are required due to depletion of aggregate sources, aggregate not conforming to Specifications, or at request of Contractor, these mixes shall be prepared as above.
 - 2. Contractor shall notify the Testing Laboratory and Architect of intent to use concrete pumps to place concrete so that mix designs can be modified accordingly.
 - 3. Mix designs with Fly Ash content greater than 15 percent of the total weight of cementitious materials shall be proportioned by ACI 318 "Building Code Requirements for Structural Concrete and Commentary."
 - a. Provide 3 percent air entrainment typical, 6 percent for mixes with f'c greater than 4,000 psi when required.
 - 4. Owner's testing laboratory shall review all mix design before submittal.
 - 5. All concrete shall have the following minimum compressive strengths in accordance with ACI 318 "Building Code Requirements for Structural Concrete and Commentary" at 28 days and shall be proportioned within the following limits:
 - a. Foundations: Use for unexposed foundation concrete except as otherwise specified:

1) Strength: 3,000 psi at 28 days.

2) Max. Aggregate Size: 1-1/2 inch.
3) Max. Water/Cement Ratio: 0.58.

4) Admixture: Water Reducing.

5) Weight: 145 pcf.

b. Building Slab On Grade: Use for interior building slab on grade, except as otherwise specified:

1) Strength: 4,000 psi at 28 days.

2) Max. Aggregate Size: 1 inch.3) Max. Water/Cement Ratio: 0.45.

4) Admixture: Water Reducing + Fly Ash.

5) Weight: 145 pcf.

c. Site: Use for exterior concrete slabs on grade such as walks, site work, mechanical and electrical pads and miscellaneous site items:

1) Strength: 3,000 psi at 28 days.

2) Max. Aggregate Size: 1 inch.3) Max. Water/Cement Ratio: 0.60.

4) Admixture: Water Reducing.

5) Weight: 145 pcf.

- B. Consistency of Concrete: Concrete slump, measured in accordance with ASTM C 143 "Test method for Slump of Hydraulic-Cement Concrete," shall fall within the following limits:
 - 1. For General concrete placement: 3 inch plus or minus 1 inch.
 - a. Polished Concrete Mix: 5" maximum.
 - 2. Mixes employing the specified high range water reducer shall provide a measured slump not to exceed 7 inch +/- 1 inch after dosing, 2 inch +/- 1 inch before dosing.
 - a. Polished Concrete Mix: 6" maximum if using water reducing admixture in lieu of water.
 - 3. Concrete slump shall be taken at point of placement. Use water reducing admixtures as required, to provide a workable consistency for pump mixers. Water shall not be added in route by truck or at the jobsite without written review by the Architect.

C. Mixing:

- 1. Equipment: All concrete shall be machine mixed. Provide adequate equipment and facilities for accurate measurement and control of materials.
- 2. Method of Mixing to comply with ACI 318 "Building Code Requirements for Structural Concrete and Commentary:"
 - a. Transit Mixing: Comply with ASTM C 94 "Specification for Ready-Mixed Concrete." Ready mixed concrete shall be used throughout, except as specified below.
 - 1) On-Site Mixing: Use only if method of storing material, mixing of material and type of mixing equipment is approved by Architect.
 - 2) Approval of site mixing does not relieve Contractor of any other requirements of Specifications.
- 3. Mixing Time: After mix water has been added, concrete shall be mixed not less than 1-1/2 minutes nor more than 1-1/2 hours. Concrete shall be rejected if not deposited within the time specified.
- 4. Admixtures:
 - a. Use automatic metering dispenser to introduce admixture into mix. Dispenser shall be recommended and calibrated by admixture manufacturer.
 - 1) Integrally Colored Concrete Color Pigment: Follow the manufacturers written recommendations for proper mixing of the selected pigment color.
 - b. Water Reducers may be used in concrete slabs on grade identified with a Polished Concrete Finish coordinate with Specification Section POLISHED CONCRETE FINISHING.
 - c. Admixtures shall be charged into mixer as a solution and shall be dispensed by an automatic dispenser or similar metering device. Powdered admixtures shall be weighed or measured by volume as recommended by manufacturer. Accuracy of measurement of any admixture shall be within plus or minus 3 percent.
 - d. Two or more admixtures may be used in same concrete, provided such admixtures are added separately during batching sequence, and provided further that admixtures used in that combination retain full efficiency and have no deleterious effect on concrete or on properties of each other.
 - e. All admixtures are to be approved by Architect prior to commencing this work.
- 5. Re-tempering:
 - a. Concrete shall be mixed only in quantities for immediate use. Concrete, which has set shall be discarded, not re-tempered.
 - b. Indiscriminate addition of water to increase slump is prohibited.
 - c. When concrete arrives at project with slump below what is suitable for placing, water may be added only if neither maximum permissible water-cement ratio nor maximum slump is exceeded.
 - 1) Water shall be incorporated by additional mixing equal to at least half of total mixing time required.

- 2) Any addition of water above that permitted by limitation of water-cement ratio shall be accompanied by a quantity of cement sufficient to maintain proper water-cement ratio.
- 3) Such additions shall only be used if approved by the Architect.
- 4) In any event, with or without addition of cement, not more than 2 gallons of water per cubic yard of concrete, over that specified in the design mix, shall be added.
- 6. Cold Weather Batching: When temperature is below 40 degrees F, or is likely to fall below 40 degrees F during a 24 hour period after placing, provide adequate equipment for heating concrete materials.
 - a. No frozen materials or materials containing ice shall be used.
 - b. Temperatures of separate materials, including mixing water, when placed in mixer shall not exceed 100 degrees F.
 - c. When placed in forms, concrete shall have a temperature between 50 degrees F and 85 degrees F.
- 7. Hot Weather Batching: Concrete deposited in hot weather shall have a placing temperature below 85 degrees F. If necessary, ingredients shall be cooled to accomplish this.

2.5 FINISHES

A. Slab Finishes:

- 1. Tooled Finishes:
 - a. Scratch Finish: Apply scratch finish to slab surfaces to receive concrete floor topping or mortar setting beds for tile, and other bonded applied cementitous finish flooring material.
 - b. Float Finish: Apply float finish to slab surfaces to receive trowel finish and other finishes as specified; membranes, elastic waterproofing, elastic roofing, or sand-bed terrazzo.
 - c. Trowel Finish: Apply a non-slip trowel finish to surfaces to be covered with resilient flooring, thin-set ceramic or quarry tile, paint or another thin film-finish coating system
 - d. Sweat Trowel Finish: Apply a non-slip steel trowel ("sweat") finish (tight circular motion pattern approved by the Architect) to slab surfaces exposed to view.
 - 1) All exterior concrete paving and concrete finishes, at exterior concrete platforms, steps, ramps, walks, and other areas requiring non-slip finishes, unless otherwise indicated, shall have a non-slip finish (as defined by PCA Portland Cement Association "Design and Control of Concrete Admixtures") applied in the following manner:
 - a) Medium Finish: On all surfaces having a pitch of less than 5 percent, Equivalent to a "Medium Finish" term, with at least a 1/16" reveal.
 - b) Rough Finish: On all surfaces having a pitch greater than 5 percent, Equivalent to a "Heavy Finish" term, with at least a 1/8" reveal.
 - e. Broom Finish: All concrete paving and concrete finishes, and exterior concrete platforms, steps, ramps and other areas requiring non-slip finishes, unless otherwise indicated, shall have a non-slip broom finish (as defined by PCA Portland Cement Association "Design and Control of Concrete Mixtures") applied in the following manner:
 - 1) Medium Broom Finish.
 - a) 1/16" reveal.
 - 2) Rough Broom Finish.
 - a) 1/8" reveal.
- 2. Applied Finishes:

- a. Slab Curing Compound (SCC): Used as a curing compound for exterior slabs on grade with no flooring applications.
- b. Clear Floor Hardener Finish (CFH): Used to prevent "dusting," where a light degree of hardness is required to the interior slab finish.
- c. Colored Floor Hardener Finish (COFH): Used to prevent "dusting," where a medium degree of hardness is required to the interior slab finish.
- d. Colored Wear-Resistant Finish (COWR): Used for slab surfaces where a heavy degree of hardness is required.
 - 1) This product must have an application of colored sealer.
- 3. Repair finishes (Vertical surfaces):
 - a. "Sack Finish:" Applied to defective surfaces mixed to the color and consistency required to match the adjacent materials in color and strength.

2.6 SOURCE QUALITY CONTROL

A. Test, Inspection:

- 1. Inspection of Mix:
 - a. Quality and quantity of material used shall be subject to continuous inspection by a qualified person. Sampling and testing of cement and aggregates in accordance with Title 24, Part 1, Section 4-335, and CBC Section 1705A, and Table 1705A.3.
 - b. Maintain sources of material supply constantly after approval of concrete mix.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

- 1. Contractor shall inspect bearing soil and report soft or loose unsuitable bearing soil to Architect.
- 2. Architect will furnish Contractor with corrective measures necessary to remedy field condition.
- 3. Do not pour concrete until suitable bearing surfaces are achieved.
- 4. At Engineered Fill, remove soft and loose unsuitable fill and replace with concrete. Cost shall be paid by Contractor.
- 5. Contractor shall inspect and identify any site conditions and/or design information that prevents the Contractor from complying with the laws, regulations and/or building codes governing ADA access compliance.

3.2 PREPARATION

A. Transportation of Concrete:

- Handle Concrete from mixer to place of final deposit as rapidly as practical by methods which shall prevent the separation or loss of the ingredients in accordance with ACI 304.3R "Heavyweight Concrete Measuring, Mixing, Transporting, and Placing."
- 2. Do not move concrete horizontally by means of vibrators.
- 3. Deposit concrete as nearly as practical at its final position in a manner which, will ensure that required quality is obtained.
- 4. Chutes shall slope not less than 4 inches and not more than 6 inches per foot of horizontal run.

B. Protection:

- 1. At old concrete or concrete which has begun to set upon which Concrete is to be placed:
 - a. Surface shall be level, cleaned of all laitance and rough with solidly embedded large aggregate exposed.
 - b. Rough surface by chipping entire surface not earlier than 5 days after set, by high pressure hosing (80 pounds per square inch) 2 to 4 hours after placing or by sand blasting with coarse silica sand, roughness amplitude shall be at least 1/4 inch.
 - c. Not more than 1/2 hour prior to pouring concrete, place 2 inch thick uniform layer of grout on old concrete.

C. Surface preparation:

- 1. Prepare all Sand Base, andmaterial as applicable prior to forming footings and trenches.
- 2. Remove all water from excavation. Divert flow of water through drains using methods to avoid washing over freshly deposited concrete.
- 3. Remove hardened concrete, wood chips, shavings and other debris from interior of forms and from reinforcing steel by vacuum process.
 - No wooden ties or blocking shall be left in concrete except where indicated for attachment of other work.
- 4. Forms shall have been erected, adequately braced, cleaned, sealed, lubricated if required, and bulkheaded where placing is to stop.
- 5. Any wood forms other than plywood shall be thoroughly water soaked before placing any concrete.
 - a. The wetting of forms shall be started at least 12 hours before concreting.
- 6. Reinforcing steel shall have been placed, tied and supported.
- 7. Coordinate with Specification Section SOIL TREATMENT before placing any concrete.
- 8. Embedded work of all trades shall be in place in the forms and adequately tied and braced.
- 9. Reinforcing steel, at the time the concrete is placed around it, shall be cleaned of scale, mill scale or other contaminants that will destroy or reduce bond.
- 10. Concrete surfaces to which fresh concrete is to be bonded shall be brush cleaned to remove all dust and foreign matter and to expose the aggregate, and then coated with the bonding adhesive herein specified.
- 11. Prior to placing concrete for any slabs on grade, the moisture content of the subgrade below the slabs shall be adjusted to at least optimum moisture.
- 12. No concrete shall be placed until formwork, reinforcement, and embedded items have been approved by the Architect.
 - a. Clean forms of all debris and remove standing water.
 - b. Thoroughly clean reinforcement and all handling equipment for mixing and transporting concrete.
 - c. Concrete shall not be placed against reinforcing steel that is hot to the touch.
- 13. Provide runways or other approved means for wheeled equipment. Do not wheel equipment over reinforcing or formwork.

3.3 INSTALLATION

- A. Placing of Rock Base, Sand Base, and:
 - 1. Rock Base:
 - a. Shall occur after scarification and compaction operations.
 - b. Preparation of sub-grade and selection and placing of Rock Base subject to continuous inspection and supervision of Geotechnical Engineer.

- c. Compact Rock Base to a density of not less than ninety-two (92) percent, but not more than ninety-five (95) percent, in accordance with Test Designation ASTM D 1557 "Test methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft.-lb./sq.ft.)."
 - 1) Density of each layer of Rock Base shall be tested and verified that it meets required density of Geotechnical Engineer prior to placing any other succeeding layers.
- d. Roll Rock Base under interior (and any designated exterior slabs) to smooth surface, free of large or sharp particles.
- e. Conduct work to minimize inspection costs.
- f. Costs of initial compaction tests shall be borne by the Owner.
 - 1) Contractor shall pay for all re-tests required due to failure of initial tests.

2. Sand base:

- a. Shall occur after scarification and compaction operations.
- b. Preparation of any sub-grade Engineered Fill, Rock Base sub-bases, placing of Vapor Retarder, and placing of Sand Base subject to continuous inspection and supervision of Geotechnical Engineer.
- c. Compact Sand Base to a density of not less than ninety-two (92) percent, but not more than ninety-five (95) percent, in accordance with Test Designation ASTM D 1557 "Test method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/sq.ft.)."
 - 1) Density of each layer of Sand Base shall be tested and verified that it meets required density of Geotechnical Engineer prior to placing any succeeding layers.
- d. Roll Sand Base under interior (and any designated exterior slabs) to smooth surface, free of large or sharp particles.
- e. Conduct work to minimize inspection costs.
- f. Costs of initial compaction tests shall be borne by the Owner. Contractor shall pay for all re-tests required due to failure of initial tests.

3. Vapor Retarder:

- a. Follow ASTM E 1643 "Standard Practice and Procedure for Installation of Vapor Retarder used in Contact with Earth Fill Under Concrete Slabs."
- b. General:
 - 1) Level, tamp or roll Earth Fill or Base Material beneath the slab in thickness as indicated on the drawings. Remove all sharp objects that could puncture the Vapor Retarder.
 - 2) Unroll Vapor Retarder over the area where the slab is to be poured, with the longest direction parallel with the direction of the pour.
 - 3) Cut to size, if necessary. Vapor Retarder used shall completely cover the pour area.
 - 4) All joints/seams, both lateral and butt, shall be overlapped six (6) inches and taped using a compatible four (4) inch wide Pressure Sensitive Seaming Tape.
 - a) Tape areas shall be free from dust, dirt and moisture to allow maximum adhesion of the pressure sensitive tape.
 - 5) Vapor Retarder shall overlap six (6) inches and seal to top of all footings and against any vertical walls. Provide manufacturer's written recommended sealant.
 - 6) Repair any damaged areas in accordance with manufacturer's written recommendations, and overlap all repairs a minimum of six (6) inches in all directions with Vapor Retarder Material, Pressure Sensitive Tape, and Vapor Proofing Mastic.
 - 7) Follow manufacturer's written recommendations for all Vertical Wall Applications.

c. Penetrations:

- 1) Seal all penetrations and check that all pipe, ductwork, rebar, wire penetrations and block-outs are thoroughly sealed.
- 2) Single Pipe Penetrations may be sealed using pipe boot constructed from the product.
 - a) Cut a piece of plastic, width 12 inches, length 1 and 1/2 times the circumference of the pipe with scissors; cut slits half the width of the film, and wrap the boot around the pipe; tape onto pipe and completely tape the base to the Vapor Retarder.
- 3) Multiple pipe penetrations in close proximity and very small pipes may be sealed using Vapor Proofing Mastic.
 - a) Cut out small area around pipes; cut a patch of Vapor Retarder extending at least 6 inches past the cut out in all directions; cut X's or small circles in the patch and install over pipes; overlap at least 6 inches and tape; build up 40-60 mils of mastic, or as needed to completely fill all voids between the pipe and Vapor Retarder.
- 4) No penetration of the Vapor Retarder is allowed except for reinforcing steel and permanent utilities.
 - a) In the case that forms must be used vapor stakes should be used to hold forms in place.
 - b) Penetrate plastic with stake; treat stake as pipe penetration (see above "penetration" paragraphs; leave stake permanently in concrete; using a power saw, cut stake off above the seal, but below the concrete finished surface; the lower portion of the vapor stake remains in place, permanently plugging the penetration.

B. Joints:

- 1. General: Construct joints straight, horizontal, true with faces perpendicular to surface plane of concrete and free of "overhangs" or "lips" to line.
- 2. Construction Joints:
 - a. Location: as indicated or as approved by Architect.
 - 1) Install as to least impair strength of structure, appearance of concrete and shall conform to typical details and in accordance with ACI Standards.
 - a) Joints between concrete and masonry shall be considered construction joints.
 - b. Spacing: Pour lengths shall be as follows, unless specifically noted otherwise.

1) Foundations: 100 feet maximum
2) Walls: 60 feet maximum
3) Structural Slabs: 60 feet o.c. maximum
4) Interior Slabs on grade: 30 feet o.c. maximum
5) Exterior Slabs on grade: 30 feet o.c. maximum

c. Installation:

- 1) Construction joints shall have level tops, vertical sides.
- 2) Construction joints shall be thoroughly cleaned and roughened by removing entire surface film and exposing clean aggregate solidly embedded in mortar matrix.
- 3) See drawings for doweling and required keys.
- 4) Roughen construction joints by any of the following methods:
 - a) By sandblasting joint.
 - b) By thoroughly washing joint, using a high pressure hose, after concrete has taken initial set. Washing shall be done not less than 2 hours nor more than 4 hours after concrete has been poured, depending upon setting time.
 - c) By chipping and wire brushing.

- d) Vertical construction joints need not be roughened
- 5) All decisions pertaining to adequacy of construction joint surfaces and to compliance with requirements pertaining to construction joints shall be reviewed with the Architect.
- 6) Just before starting new pour, horizontal and vertical joint surfaces shall be dampened (but not saturated).
- 7) Before placing regular concrete mix, horizontal and vertical joint surfaces shall be covered with a layer of mortar composed of cement and fine aggregate of same proportions as that used in prescribed mix, but omitting coarse aggregate.
- 3. Control Joints (Contraction Joints):
 - a. Location: as indicated or as approved by Architect.
 - 1) Construction and expansion joints shall be considered as control joints.
 - b. Spacing:
 - 1) Exterior Slab on grade: 10 feet o.c. maximum, unless otherwise noted.
 - 2) Interior Slab on grade: 15 feet o.c. maximum.
 - a) Maximum area not to exceed 225 sf.
 - b) Maximum length to width not to exceed 1 to 1 1/2 ratio.
 - c) Conform to bay spacing wherever possible (at column centerlines, half bays, third bays, etc).
 - c. Installation: Form weakened-plane control joints, sectioning concrete into areas as indicated.
 - 1) Use saw cuts 1/8 inch wide by 1/4 of slab depth, or tooled joints with rounded edges 1/8 inch wide by 1/4 of slab depth, unless specifically noted otherwise.
 - Control joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing without dislodging aggregate and with no spalling of edges on either side of the joint.
 - 3) Slab reinforcing need not be terminated at control joints.

C. Placing of Concrete - General:

- 1. All concrete shall be placed under direct observation of the Owner's Inspector.
- 2. Notify Owner's Inspector not less than forty-eight (48) hours prior to pouring of first concrete.
- 3. Place concrete in accordance with ACI 304.3R "Heavyweight Concrete Measuring, Mixing, Transporting, and Placing."
- 4. Do not place Concrete outside of regular working hours except to complete work already started.
- 5. Do not use Concrete which has been mixed for a period longer than one and one-half (1-1/2) hours or which has started to stiffen or set.
- 6. Re-mixing on concrete, which has started to set, shall not be permitted.
- 7. Pouring of concrete shall be a continuous operation until the completion of the Section or Panel in accordance with ACI 304.3R "Heavyweight Concrete Measuring, Mixing, Transporting, and Placing."
- 8. Consolidation:
 - a. Concrete shall be thoroughly compacted and worked to all points with solid continuous contact to forms and reinforcement to eliminate air pockets and honeycombing.
 - b. Power vibrators shall be used immediately following pour.
 - c. Spading by hand, hammering of forms or other combination of methods will be allowed only where permitted by Architect.
 - d. In no case shall vibrators be placed against reinforcing steel or used for extensive shifting of deposited fresh concrete.
 - e. Provide and maintain standby vibrators, ready for immediate use.

- 9. Keep a record of times, dates and locations of all concrete placing operations for the duration of the project. Record shall be available to Architect and Owner's Inspector at all times
- 10. In no case shall concrete be poured into an accumulation of water ahead of pour.
- 11. If any concrete operation, once planned, can not be completed in a continuous operation, placement shall stop at temporary bulkheads located where resulting construction joints will least impair the strength of the structure. The location of construction joints shall be as shown on the drawings, or as approved by Architect.
- 12. Hot Weather Concreting: Unless otherwise directed by the Architect, perform all work in accordance with ACI 305.1 "Specification for Hot Weather Concreting" when air temperature rises above 75 degrees F and the following:
 - a. Mixing Water: Keep water temperature as low as necessary to provide for the required concrete temperature at time of placing. Ice may be required to provide for the design temperature.
 - b. Aggregate: Keep aggregate piles continuously moist by sprinkling with water.
 - c. Temperature of Concrete: The temperature of the concrete mix at the time it is being placed in the forms shall not exceed 85 degrees F.
 - 1) The method employed to provide this temperature shall in no way alter or endanger the design mix or the design strength required.
 - 2) Dampen subgrade and formwork before placing concrete.
 - 3) Remove all excess water before placing concrete.
 - 4) Keep concrete continuously wet when air temperature exceeds 85 degrees F for a minimum of 48 hours after placing concrete.
 - d. Protection: Minimize evaporation from concrete in place by providing shade and windbreaks. Maintain such protection for 14 days minimum.
- 13. Cold Weather Concreting: Follow recommended ACI 306R "Cold Weather Concreting" procedures when air temperature falls below 40 degrees F, as approved by Architect.
 - a. Concrete placed in freezing temperature shall have a temperature of not less than 50 degrees F.
 - b. Maintain this temperature for at least 7 days.
 - c. No chemicals or salts shall be used to prevent freezing and no accelerating agents shall be used without prior approval from Architect.
- 14. Concrete shall not be placed if sand overlying the vapor retarder barrier has been allowed to attain a moisture content greater than 5 percent due to precipitation or excessive watering.
- D. Placing of Concrete at Footings, Walls, Columns, etc.:
 - 1. Concrete shall be placed in layers not to exceed twenty-four (24) inches in depth, and shall be thoroughly compacted.
 - a. Wait forty minutes before placing next layer.
 - b. Re-vibrate six (6) inches into previous lift before next lift is added.
 - c. Locate top of lift at or below top of wall opening.
 - 2. Use openings in forms, elephant trunks or other approved methods to prevent accumulation of concrete on forms and reinforcement above the level of pour.
 - a. Unconfined free falls shall not exceed five (5) feet.
 - 3. Where placing or consolidation is restricted by close assemblage of reinforcing and/or forms use a Modified Mix Concrete with smaller aggregate and/or pour 3 inches of neat grout into form prior to regular mix.
 - 4. Concrete shall not be flowed horizontally along forms.
- E. Placing of concrete at slab on grade:
 - 1. Slabs on grade shall not be poured until the sub-grade has been thoroughly compacted and properly prepared, complete with vapor retarder or barrier, nor until reinforcement and inserts are securely fastened in place.

- a. Sub-grade above and below vapor retarder where installed resilient flooring products or rubber/vinyl-backed products are proposed to be installed shall not be moistened prior to pouring concrete.
- 2. No greater area shall be poured at one time than can be properly finished without checking.
- 3. Slabs on grade shall be laid out in a checkerboard pattern when applicable. Pour and allow alternate slabs to set.
 - a. Fill out balance of checkerboard pattern with subsequent pour.
- 4. Concrete shall be poured as dry as possible, consistent with good workmanship.
 - a. Water shall not be added to mix to improve workability without approval of the Architect.
- 5. Concrete shall be compacted by hand tamping and by mechanical vibration.
 - a. After the concrete is thoroughly compacted, the surface shall be screeded off, any surface water removed an finish applied as specified.
- 6. The Contractor may, on approval of DSA and the Architect, use a Finish Enhancing Admixture (High Range Water Reducer) in accordance with Article Titled MATERIALS.

F. Placing of concrete by pumps:

- 1. If pumps are used to place concrete, the fines (3/8" and smaller) shall not exceed 45 percent of the total volume of aggregate. Standby equipment must be provided to insure completing pours to planned cutoffs.
- 2. Pumps shall handle concrete at a uniform rate without bleeding or segregation of aggregates. Concrete from end of the hose shall have a free fall not to exceed four (4) feet. Aluminum pipe shall not be used to transport pumped concrete.
- G. Installation of nonshrink grout or drypack: Install under base plates immediately after erection of structural steel.
 - 1. General: Ram in thin layers, using a short length of ram, the free end of which shall be struck with a heavy hammer or mallet, several blows for each layer, to compact the mixture. When completed, the exposed drypack shall show slight indication of moisture.
 - 2. Curing: Cure with a curing compound or with moisture-retaining barrier kept wet.
- H. Placing of concrete on above grade slabs:
 - 1. General: In addition to all the preceding requirements for pouring concrete, on above grade slabs the contractor shall coordinate the pour so as to not over stress the structure and evenly distribute the pours to minimize deflection for the structural members in order to minimize slab cracking.

3.4 APPLICATION

- A. Finishes application:
 - 1. Screed, consolidate, and level concrete slabs prior to any Finishes.
 - 2. Tooled Finishes:
 - a. Scratch finish:
 - After screeding, consolidating, and leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
 - b. Float finish:
 - 1) After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating.
 - 2) Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both.

- 3) Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power units.
- 4) Finish surfaces to tolerances indicated.
- 5) Cut down high spots and fill low spots.
- 6) Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

c. Trowel finish:

- 1) After floating, begin first trowel-finish operation using a power-driven trowel.
 - a) Begin final troweling when surface produces a ringing sound as trowel is moved over surface.
 - b) Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances indicated.
 - c) Grind smooth any surface defects that would telegraph through applied floor covering system.
- 2) Where thin set ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.
- 3) Apply a non-slip "Sweat Trowel" finish (tight circular motion approved by the Architect) to exterior slabs in the final troweling operation.

d. Broom finish:

- 1) Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route for the indicated broom finish.
- 2) Medium Broom Finish: On all surfaces having a pitch of less than 6 percent.
- 3) Rough Broom Finish: On all surfaces having a pitch of more than 6 percent.

3. Applied Finishes:

- a. Slab Curing Compound Finish (SCC):
 - 1) Apply Clear Slab Curing Compound Sealer Finish in accordance with manufacturer's written recommendations, and in exterior areas only as indicated by the Contract Documents.
- b. Clear Floor Sealer Finish (CFS):
 - 1) Apply Clear Floor Sealer Finish in accordance with manufacturer's written recommendations, and in areas as indicated by the Contract Documents.
- c. Clear Floor Hardener Finish (CFH):
 - Apply Clear Floor Hardener Finish in accordance with manufacturer's written recommendations, and in areas as indicated by the Contract Documents.
- d. Colored Floor Hardener Finish (COFH):
 - Apply Colored Floor Hardener Finish in accordance with manufacturer's written recommendations, and in areas as indicated by the Contract Documents.
- e. Colored Wear-Resistant Finish (COWR):
 - 1) Apply dry shake materials for the colored wear-resistant finish at a minimum rate of 100 lb per 100 sq. ft.
 - 2) Immediately following the first floating operation, uniformly distribute with mechanical spreader approximately two-thirds of the required weight of the dry shake material over the concrete surface, and embed by power floating.
 - a) Follow floating operation with second shake application, uniformly distributing remainder of dry shake material with overlapping applications to ensure uniform color, and embed by power floating.

- 3) After broadcasting and floating, apply a trowel finish as specified.
 - a) Cure slab surface with a curing compound recommended by the dry shake material manufacturer.
 - b) Apply the curing compound sealer immediately after the final finishing.

4. Repair Finishes:

- a. Sack Finish: Use only enough water as required for handling and placing.
 - 1) Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than one (1) inch.
 - a) Make edges of cuts perpendicular to the concrete surface.
 - b) Thoroughly clean, dampen with water, and brush-coat the area to be patched with a bonding agent.
 - c) Place patching mortar before bonding agent has dried.
 - 2) For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color.
 - a) Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching.
 - b) Compact mortar in place and strike-off slightly higher than surrounding surface.

B. Concrete curing and protection:

- 1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
 - a. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material.
 - b. Apply according to manufacturer's written instructions after screeding and bull floating, but before power floating and troweling.
- 2. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than ten (10) days.
- 3. Formed Surfaces:
 - a. Wet forms immediately after pouring.
 - b. Keep forms and exposed surfaces wet until forms are removed.
 - c. Keep all surfaces wet after forms are removed for ten (10) days after placement of Concrete.
- 4. Concrete Slab Curing Methods:
 - a. One spray coat of clear curing compound.
 - 1) Agitate curing compounds thoroughly by Mechanical means continuously during use and spray or brush uniformly in accordance with manufacturer's written recommendations.
 - 2) Not applicable for:
 - a) Slabs designated for Adhesively Applied Floor Coverings.
 - b) Slabs designated for Resinous Flooring on top of concrete slab.
 - c) Slabs designated for Polished Concrete Finishing.
 - b. Curing paper:
 - 1) Anchor the paper or film securely and seal all edges in such a manner as to prevent moisture escaping from concrete.
 - 2) Protect all exposed surfaces with "Curing Paper." Curing Paper shall be kept moist.
 - 3) Contractor shall be responsible for protection of finished concrete against injury by rain, cold, vibration, animal tracks, marking by visitors, vandalism, etc.

- 4) Required for the following:
 - a) All interior concrete slabs.

3.5 CONSTRUCTION

A. Site Tolerances:

- 1. Exterior Site Improvements:
 - a. Placement of all concrete shall not exceed 0.02 feet variance from designated grades.
 - b. Surface variation of all concrete slabs shall not exceed 0.01 foot in 10 feet.
 - c. Construction of all concrete subject to ADA access compliance, including Accessible Path of Travel, curb returns, parking stalls and unloading areas, barrier free amenities and / or other applicable site improvements shall conform to the Americans with Disabilities Act, California Title 24 and the California Building Code, regardless of any construction tolerances. Examples of minimum and maximum limits related to ADA access compliance include, but are not limited to:
 - 1) Accessible Path of Travel cross-slope shall not exceed 2 percent.
 - 2) Accessible Path of Travel longitudinal slopes shall not exceed 5 percent.
 - 3) Ramp longitudinal slopes shall not exceed 8.33 percent.
 - 4) Walks shall not have less than 48 inches in unobstructed width.
 - d. Contractor shall maintain all grades and slopes through out construction and until Notice of Completion has been filed.

2. Building Slabs:

- a. General: All surface variations of slabs shall be 1/8 inch in 10 feet. Uniformly slope slab surfaces to drains where indicated on the drawings.
- b. Additional Installation Tolerances:
 - 1) FF (Floor Flatness) and FL (Floor Levelness): The Contractor shall measure according to ASTM E 1155 "Standard test method for Determining FF (Floor Flatness) and FL (Floor Levelness) Numbers," within twenty-four (24) hours of the pour.
 - a) Cut down high spots, and fill low spots, and adjust pour techniques to achieve floor tolerances specified.
 - b) Contractor shall pay for and have a Certified Report in writing from an Independent Testing Agency that concrete substrates requiring FF and FL only are constructed to the specified tolerances, and are ready for floor coverings that require FF and FL.
 - c) SOV = Specified Overall Value.
 - d) MLV = Minimum Local Value.
 - e) Required tolerances of concrete surface substrates for specific flooring systems:
 - f) Polished Concrete: Refer to Specification Section POLISHED CONCRETE FINISHING.
- c. Typical Building Slabs:
 - 1) Flatness: SOV, greater than FF 35, MLV, greater than FF 24.
 - 2) Levelness: SOV, greater than FL 25, MLV, greater than FL 17.
- d. Polished Concrete Flooring Slabs:
 - 1) Flatness: SOV,: greater than FF 45, MLV,: greater than FF 30.
 - 2) Levelness: SOV,: greater than FL 35, MLV,: greater than FL 24.

3.6 REPAIR/RESTORATION

A. Minor Defects:

- 1. Minor defects in concrete shall mean any of the following:
 - a. Pour joints, voids, rock pockets, tie holes, etc. where strength, and durability is not adversely affected.
 - b. Shrinkage Cracks where slabs are not exposed or where appearance is not important
 - c. Minor defects of pour joints, voids, rock pockets, tie holes, etc.
 - d. Immediately after removing forms, inspect all concrete surfaces. Patch any pour joints, voids, rock pockets, tie holes, etc., as soon as possible, but not until the defect has been examined by the Architect.
 - e. Chip away defective areas to a minimum depth of one inch, with edges perpendicular to surface. Clean area to be patched of all laitance.
 - f. Coat area to be patched with Bonding Agent. Patch with Mortar mixed with Bonding Agent thoroughly compacted into place and screeded off to leave the patch slightly higher than the surrounding surface. After at least one hour finish patch to match the adjoining surface. Cure patch by application of curing compound or by wetting for seven (7) days.
 - g. Fill tie holes solid with mortar after cleaning and thoroughly wetting. Fill through holes by means of a plunger-type grease gun. See Specification Section CONCRETE FORMWORK, Part 3 Article titled "INSTALLATION," and the paragraph titled "Indentations" for exception.
 - h. Remove fins and rough surfaces from all exposed concrete.
- 2. Minor defect of shrinkage cracks:
 - a. After entire slab is finished and fully cured, shrinkage cracks larger than 1/32 inch wide shall be filled with cement grout and struck off level with surface.

B. Serious Defects:

- 1. Serious defects in concrete shall mean any of the following:
 - a. Concrete not meeting 100 percent of the specified 28 day compressive strength.
 - b. Concrete exhibiting rock pockets, voids, spalls, streaks, cracks, exposed reinforcing to extent that strength, durability, or appearance is adversely affected.
 - c. Concrete significantly out of place, line or level.
 - d. Concrete not containing the required embedded items.
 - e. Shrinkage Cracks where slabs are exposed and appearance is important.
 - f. Concrete where patching does not satisfactorily restore quality and appearance of surface.
- 2. Upon determination that concrete strength is defective:
 - a. Should cylinder tests fall below minimum strength specified, concrete mix for remainder of work shall be adjusted to produce required strength. Core samples shall be taken and tested from cast-in-place concrete where cylinders and samples indicate inferior concrete with less than minimum specified strength.
 - b. Cores of hardened concrete shall be taken and tested in accordance with ASTM C 39 "Test method for Compressive Strength of Cylindrical Concrete Specimens" and ASTM C 42 "Test method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete." Number and location of such cores shall be subject to the approval of Architect.
 - c. Cost of core sampling and testing will be paid for by the Contractor.
 - d. "500 psi" and "85 percent" reduction in ACI 318 "Building Code requirements for Structural Concrete and Commentary," Section 26.12.4 will not justify low cylinder tests.
 - e. If core tests indicate that concrete is below the strength specified, the concrete shall be deemed defective, and shall be removed and replaced without additional cost to the Owner.
- 3. Major defect of shrinkage cracks.

- a. After entire slab is finished and fully cured, unsightly shrinkage cracks shall be repaired in a manner satisfactory in appearance to the Architect. If this cannot be accomplished, concrete shall be considered defective.
- 4. Upon determining that concrete surface is defective:
 - a. Contractor may restore concrete to acceptable condition by cutting, chipping, pointing, patching, grinding, if this can be done without significantly altering strength of structure.
 - b. Permission to patch defective areas will not be considered a waiver of the right to require removal if patching does not, in the opinion of the Architect, satisfactorily restore quality and appearance.
 - c. If patching does not restore concrete to specified quality and appearance, the concrete shall be deemed defective, and shall be removed and replaced without additional cost to the Owner.
 - d. No repair work shall begin until concrete has been examined and procedures have been reviewed by the Architect and Structural Engineer and approved by DSA.
- 5. Repair defects by complete removal of concrete and replacement or repair defects with Shotcrete in accordance with CBC Sections 1908A, strength to match mix design and material being repaired.
- 6. Place and cure Shotcrete in accordance with CBC Section 1908A.
- 7. Inspect and test Shotcrete as per CBC Section 1908A.10.
- C. Cost of repairing shall be borne by the Contractor.

3.7 FIELD QUALITY CONTROL

- A. Contractor's Field Quality Control:
 - 1. Contractor shall protect slabs receiving flooring products from excess moisture after the curing process, removing excess moisture after rains, broken water pipes, etc., to ensure that the monolithic slabs are dry enough for application of flooring products. When all spaces have been enclosed, acclimate the building as soon as possible with the building's own mechanical heating and cooling system, and other outside devices as required to properly prepare the monolithic slabs for flooring installation.
 - a. The test sites for the RH Tests shall be at the same room temperature and humidity expected during normal use. If this is not possible, then the test site conditions should be 75 degrees F (plus or minus 10 degrees F) and 50 percent relative humidity (plus or minus 10 percent relative humidity) 48 hours prior to, and during testing.
 - 2. Contractor shall maintain temperature and humidity in a manner not deleterious to the flooring materials installed until the Owner assumes occupancy.

B. Inspection:

1. Project Inspector shall inspect placement of concrete and grout.

C. Manufacturer's Field Services:

- Contractor shall notify Vapor Retarder manufacturer at least one week prior to the Pre-Construction Conference regarding the Vapor Retarder installation, and will schedule subsequent visits at the appropriate times with at least one week's notice to ensure proper installation of the Vapor Retarder in accordance with the Manufacturer's Written Instructions.
- 2. Manufacturer shall provide and written Inspection and installation certification to the Architect that full compliance with the manufacturer's written instructions were followed and adhered to prior to covering with concrete.

3.8 CLEANING

- A. The top of all concrete foundations receiving concrete masonry units shall be washed free of all laitance and loose concrete, and roughened to a roughness amplitude of 1/4".
- B. Remove all debris, excess materials, tools, and equipment resulting from or used in this operation at completion of work.

END OF SECTION

SECTION 033500 – POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely provide polished concrete finishing materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 11 01 CONCRETE FORMWORK
 - 4. 03 30 00 CAST-IN-PLACE CONCRETE
 - 5. 07 92 00 SEALANTS
 - 6. 09 65 10 RESILIENT BASE AND ACCESSORIES
 - 7. 09 68 40 CARPET
 - 8. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

- 1. In accordance with the following standards:
 - a. ACI American Concrete Institute.
 - 1) ACI 302.1R "Guide for Concrete Floor and Slab Construction."
 - b. ASTM American Society of Testing Materials.
 - c. NFSI National Floor Safety Institute.
 - 1) NFSI Test Method 101-A "Standard for Evaluating High-Traction Flooring Materials, Coatings, and Finishes."
 - d. RILEM Reunion Internationale des Laboratoires D'Essais et de Recherches sur les Materiaux et les Consructions.
 - 1) RILEM Test Method 11.4 "Standard Measurement of Reduction of Moisture Penetration Through Horizontal Concrete Surfaces."

1.3 DEFINITIONS

- A. New Concrete: Concrete poured as part of this Project. Refer to Specification Section CAST-IN-PLACE CONCRETE.
- B. Existing Concrete: Any slab existing (or poured) prior to this Project.

1.4 SYSTEM DESCRIPTION

- A. Performance Requirements: It is the intention of this section and the drawings to form a guide for a complete system. Any items not specifically noted but necessary for a complete system shall be provided under this section.
 - 1. Fire Rating: Class "A" Fire Rated when tested in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials."
 - 2. Abrasion Resistance:
 - a. ASTM C 779 "Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces," Method A, high resistance, no more than 0.008 inch (0.20 mm) wear in 30 minutes.
 - 3. Reflectivity: Increase of 35 percent as determined by standard gloss meter.
 - a. ASTM E 430, "Standard Test Methods for measurement of Gloss or High-Gloss Surfaces by Abridged Goniophotometry."
 - 4. Waterproof Properties: RILEM Test Method 11.4, 70 percent or greater reduction in absorption.
 - 5. High Traction Rating after Polishing: NFSI 101-A, non-slip properties.
 - a. Static Coefficient of Friction: For Polished Concrete Floors, all walkway surfaces shall comply with the ADA Requirements and the following minimum values as determined by testing identical products per ASTM C 1028 "Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method:"
 - 1) Level Surfaces: Minimum 0.6.
 - 2) Ramps: Minimum 0.8.

B. Design Requirements:

- 1. Verify Hardened Concrete Properties:
 - a. Minimum new concrete compressive strength Minimum 3,500 psi required.
 - b. Floor slab to be polished is Normal Weight Concrete.
 - 1) That no Lightweight Aggregate Concrete is used in the mix.
 - 2) That no Air Entrained Concrete Admixture is used in the mix.
- 2. Verify Placement Properties:
 - a. That the natural concrete slump of concrete mix was between 4-1/2 inches -5 inches.
 - b. Flatness and Levelness Requirements in accordance with ASTM E 1155 "Standard test method for Determining FF (Floor Flatness) and FL (Floor Levelness) Numbers:"
 - 1) Flatness: SOV, greater than FF 45, MLV, greater than FF 30.
 - 2) Levelness: SOV, greater than FL 35, MLV, greater than FL 24.
- 3. Verify that the finish of the concrete slab was accomplished with Hard-Steel Trowels, and that the minimum passes for the slab was at least three (3) passes, and that there were no burn marks.
 - a. Finish shall comply with ACI 302.1R, Class 5 Floor.
- 4. Verify that the Curing Options used for the floor slab were at least one of the following:
 - a. Sheet membrane (ASTM C 171 "Specification for Sheet materials for Curing Concrete").
 - 1) Polyethylene Film is NOT ALLOWED.
 - b. Damp Curing Process:
 - 1) Seven Day Cure minimum.
- 5. Verify that no Spray-On "Cure and Seal" curing compounds were used.

1.5 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - a. Submit product data for specified products.
 - b. Material Safety Data Sheets (MSDS).
 - c. Standard Colored Concrete dyes or stains for selection by the Architect.
 - d. Joint and Crack filler color range for selection by the Architect.
 - 2. Shop Drawings.
 - a. Typical layout showing the colored concrete treatment areas per color choice.
 - b. Typical layout including dimensions and floor grinding schedule.
 - c. Plan view of floor and joint pattern layout.
 - 3. Quality Assurance/Control Submittals:
 - a. Test Reports:
 - 1) Submit three (3) copies of reports.
 - a) Certified test reports showing compliance with specified performance characteristics and physical properties as cited in Design Requirements article.
 - b) Manufacturers Field Reports indicating that the manufacturer has read and instructed the installer of the proper procedures in regards to the Manufacturer's installation instructions prior to the start of the Polishing Operations.
 - c) Manufacturers Field Reports indicating Installers compliance with Manufacturer's Installation Instructions at the end of the Polishing Operations.
 - b. Certificates:
 - 1) Submit three (3) copies of certificates.
 - a) Product certificates signed by manufacturer certifying materials comply with specified performance characteristics, criteria, and physical requirements.
 - b) Letter of certification from the National Floor Safety Institute confirming the system has been tested and passed phase Two Level of certification when tested by Method 101-A.
 - c) Current contractor's certificate signed by manufacturer declaring contractor as an approved installer of polishing system.
 - c. Manufacturer's Written Instructions:
 - 1) Submit three (3) copies of manufacturer's written procedural instructions.
 - 4. Closeout Submittals in accordance with the following:
 - a. Maintenance Data in accordance with Specification Section PROJECT CLOSEOUT.
 - Record Documents in accordance with Specification Section RECORD DOCUMENTS.
 - c. Warranty in accordance with Specification Section WARRANTIES.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications:
 - a. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

- b. Installer trained and holding current manufacturer's certification for Polished Concrete Finish installation.
 - 1) Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions and data sheets.
 - 2) Use only manufacturer certified Polished Concrete Finishing installers.
 - 3) Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

2. Manufacturer/Supplier Qualifications:

a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:

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

C. Mockups:

- 1. Mock-Up Size: One 100 ft² sample panel at jobsite at location as directed under conditions similar to those which will exist during actual placement.
 - a. Mockups shall be located in a space that is not visible to the public, such as ancillary spaces, maintenance rooms, mechanical rooms, or rooms that will receive carpet. Refer to Finish Schedule.
 - b. Mockup grinding grades GGL II thru III for each color and finish for the Architect to select.
 - c. Show:
 - 1) Several intensities of colors for selection by Architect. More intense dye concentrations may be required to achieve color.
 - 2) Colors immediately adjacent to show workmanship in control of pattern.
 - 3) Partial sample of graphic at 100% scale.
 - 4) Partial sample of pattern: filled joints, colored, scored.
- 2. Allow 24 hours for inspection of mock-up before proceeding with work.
- 3. Mock-up will be used to judge workmanship, concrete substrate preparation, operation of equipment, material application, polished concrete shine, color, and proposed protection methods during construction.
 - Coordinate with Specification Section CAST-IN-PLACE CONCRETE for Integral Color applications and color selections.
- 4. Remove mock-up and dispose of materials when no longer required and when directed by the Architect.

D. Meetings:

- 1. New Concrete: Schedule prior to the concrete pour.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements, such as:
 - 1) Environmental requirements.
 - 2) Concrete mix requirements.
 - 3) Concrete curing requirements.

- 4) Concrete protection requirements.
- 2. Pre-Installation: Schedule prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements, such as:
 - 1) Environmental requirements.
 - 2) Scheduling and phasing of work.
 - 3) Coordinating with other work and personnel.
 - 4) Protection of adjacent surfaces.
 - 5) Surface preparation.
 - 6) Repair of defects and defective work prior to installation.
 - 7) Cleaning.
 - 8) Preparation and application of the Stains or Dyes to the floor areas in compliance with the floor coloring plan.
 - 9) Application of liquid hardener, densifier.
 - 10) Installation of polished floor finishes.
 - 11) Protection of finished surfaces after installation.
- 3. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 4. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems, which may impede issuance of warranties or guaranties.
 - b. Maintaining installed work until the Final Inspection by the Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 - 1. Products shall be handled in such a manner as to assure that they are free from damage.
 - 2. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
 - 3. Delivery:
 - a. Deliver materials in manufacturer's original packaging with identification labels and seals intact.
- B. Acceptance at Site:
 - 1. Damaged products will not be accepted.
 - 2. Products must be in manufacturer's original unopened containers with labels indicating brand name, product number, and grade.
- C. Storage and protection:
 - 1. Storage and Protection:
 - a. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 - 1) Store under cover in a cool place with temperatures between 40 and 90 degrees F. Protect from freezing. Don't stack packages or buckets more than three high.
 - b. Protect concrete slab prior to stains, dyes, and polishing:
 - 1) Protect from petroleum stains during construction.
 - 2) Diaper hydraulic power equipment.

- 3) Restrict vehicular parking.
- 4) Restrict use of pipe cutting machinery.
- 5) Restrict placement of reinforcing steel on slab.
- 6) Restrict use of acids or acidic detergents on slab.
- 7) Restrict use of adhesives on slab.
- 2. Waste Management and Disposal:
 - a. Remove from site and legally dispose of packaging materials.

1.8 PROJECT CONDITIONS

A. Environmental requirements:

- 1. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles.
- 2. Rain: The work under this section shall not be started or maintained under threat of rain unless the work is not affected by the rain.
- 3. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting topping performance.
- 4. Temporary Lighting: Provide a minimum 200W light source, placed 8 feet above floor surface, for each 425 sq ft of floor being finished.
- 5. Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with manufacturer's instructions.
- 6. Verify that the concrete surface meets the Design Requirements within this specification.

B. Existing Conditions:

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

1.9 SEQUENCING AND SCHEDULING

- A. Sequence with Other Work: Comply with manufacturer's written recommendations for sequencing construction operations. It is imperative that this work be done before any framing is in place upon the slab, otherwise the consistency of the finish would be compromised if done at a later date within the construction operations.
 - 1. Grinding:
 - a. Identify the areas of existing or new slab construction, and coordinate the Grinding Grade Level required for each area.
 - 2. Integral Color and Polishing:
 - a. Provide integral color within the concrete mix at the time of pouring the slab, then allow a minimum of 28 days (but no more than 60 days) before the polishing operations begin.
 - 3. Dye and Polishing:
 - a. Provide dye operations in accordance with manufacturer's written instructions before the polishing operations begin.
 - 4. Stain and Polishing:
 - a. Provide stain operations in accordance with manufacturer's written instructions before the polishing operations begin.

POLISHED CONCRETE FINISHING

1.10 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period: One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES
 - a. Warranty Period: One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified Polishing Concrete Finishing product manufacturer:
 - a. L & M CONSTRUCTION CHEMICALS: "PermaShine System."
 - b. Acceptable alternative manufacturers:
 - 1) ADVANCED FLOOR PRODUCTS: "RetroPlate 99."
 - 2) DAYTON SUPERIOR: "Diamond Polish Floor Systems."
 - 3) DIAMATIC: "Ultraflor."
 - 4) THE BOMANITE CO.: "Manufacturer's Standard."
 - 5) PERFECT POLISH: "Natural Wonder Floor System."
 - 6) SCHOFIELD: "Formular One."
 - 7) W.R.MEADOWS: "Indurashine."
 - 2. Specified Concrete Dye product manufacturer:
 - a. L & M CONSTRUCTION CHEMICALS, INC.: "Vivid Concrete Dyes."
 - b. Acceptable alternative manufacturers:
 - 1) ADVANCED FLOOR PRODUCTS: "Manufacturer's Standard."
 - 2) AMERIPOLISH: "Manufacturer's Standard."
 - 3) DIAMATIC: "Manufacturer's Standard."
 - 4) DAYTON SUPERIOR: "Pro Aqua Vivid Dyes."
 - 5) THE BOMANITE CO.: "Pantene Teres Dyes."
 - 6) PERFECT POLISH: "Manufacturer's Standard."
 - 7) SCHOFIELD: "Formula One" Liquid Dye Concentrate.
 - 3. Specified Concrete Stain product manufacturer:
 - a. DAYTON SUPERIOR: "Pro Patina Stains."
 - b. Acceptable alternative manufacturers:
 - 1) ADVANCED FLOOR PRODUCTS: "Manufacturer's Standard."
 - 2) DIAMATIC: "Manufacturer's Standard."
 - 3) L & M CONSTRUCTION CHEMICALS: "Manufacturer's Standard."

POLISHED CONCRETE FINISHING

- 4) THE BOMANITE CO.: "Manufacturer's Standard."
- 5) PERFECT POLISH: "Manufacturer's Standard."
- 4. Specified Hardener / Densifier product manufacturer:
 - a. L & M CONSTRUCTION CHEMICALS, INC.: "FGS Hardener Plus."
 - 1) Acceptable alternative product manufacturers:
 - a) THE BOMANITE CO.: "StabilizerPro."
 - b) THE BOMANITE CO.: "VitraFinish."
 - c) DYAMATIC: "Flor-Sil" Densifier and "Flor-Finish" Finish
 - d) W.R.MEADOWS: "Bellatrix" or "Liqui-Hard."
- 5. Specified Oil Repellent Sealer product manufacturer:
 - a. L & M CONSTRUCTION CHEMICALS, INC.: "Petrotex."
 - 1) Acceptable alternative product manufacturers:
 - a) THE BOMANITE CO.: "VitraFinish."
- 6. Specified Joint Filler product manufacturer:
 - a. L & M CONSTRUCTION CHEMICALS, INC.: "Joint Tite 750."
 - 1) Acceptable alternative product manufacturers:
 - a) EUCLID: "Quick Joint 200."
- 7. Specified Protective Cover product manufacturer:
 - a. RAM BOARD: "Ram Board."
 - 1) Acceptable alternative product manufacturers:
 - a) McTECH GROUP: "EZcover."
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Products:
 - 1. Integral Color: See Specification Section CAST-IN-PLACE CONCRETE.
 - 2. Water shall be potable.
 - 3. Concrete Dyes:
 - a. Provide fast-drying dye, packaged in premanufactured units ready for mixing with VOC Exempt Solvent, formulated for application to polished cementitious surfaces.
 - 1) Provide manufacturer's Standard Color Options for selection by Architect.
 - 4. Concrete Stains:
 - a. Water-Based, penetrating, reactive stains, that creates a chemical reaction within the concrete substrate, and formulated for application to polished concrete surfaces.
 - 1) Provide manufacturer's Standard Color Options for selection by Architect.
 - 2) No "Acid Etching Stains" allowed.
 - 5. Joint Filler: Semi-rigid, 2-component, self-leveling, 100% solids, rapid curing, polyurea control joint and crack filler with Shore A 80 or higher hardness.
 - 6. Hardener / Densifier: Water based, odorless liquid, VOC compliant, environmentally safe chemical hardening solution leaving no surface film.
 - 7. Oil Repellent Sealer: Ready to use, silane, siloxane and fluoropolymers blended water based solution sealer, quick drying, low-odor, oil and water repellent, VOC compliant and compatible with chemically hardened floors.

POLISHED CONCRETE FINISHING

2.3 FINISHES

- A. Gloss Reading Standards, in accordance with ASTM E 430, "Standard Test Methods for measurement of Gloss or High-Gloss Surfaces by Abridged Goniophotometry".
 - 1. GL-1 (Matte) 50 grit.
 - a. Gloss Reading: 2.
 - b. Maximum Level of Slip Resistance (COF): 0.747.
 - c. Mohs Hardness Factor Range: 4.5.
 - 2. GL-2 (Matte) 120 grit.
 - a. Gloss Reading: 4.
 - b. Maximum Level of Slip Resistance (COF): 0.733.
 - c. Mohs Hardness Factor Range: 5.0.
 - 3. GL-3 (Matte) 220 grit.
 - a. Gloss Reading: 7.
 - b. Maximum Level of Slip Resistance (COF): 0.76.
 - c. Mohs Hardness Factor Range: 5.5.
 - 4. GL-4 (Low Sheen) 400 grit.
 - a. Gloss Reading: 23-25.
 - b. Maximum Level of Slip Resistance (COF): 0.803.
 - c. Mohs Hardness Factor Range: 7.0.
 - 5. GL-5 (Semi-Gloss) 800 grit.
 - a. Gloss Reading: 38-42.
 - b. Maximum Level of Slip Resistance (COF): 0.656.
 - c. Mohs Hardness Factor Range: 7.5.
 - 6. GL-6 (Semi-Gloss) 1800 grit.
 - a. Gloss Reading: 46-52.
 - b. Maximum Level of Slip Resistance (COF): 0.635.
 - c. Mohs Hardness Factor Range: 7.5

B. Verification of Performance:

1. Ensure concrete finishing components and materials are from a single manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

A. Coordination:

POLISHED CONCRETE FINISHING

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

B. Protection:

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

C. Surface preparation:

- 1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
- 2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
- 3. Determine the Grind Grade level related to the depth of cut, indicating the amount of aggregate that is to be revealed during the initial grinding of the surface:
 - a. GGL-I Grind Grade Level I (Cream Finish):
 - 1) Grinding only the Portland Paste at the surface of the substrate without exposing small, medium or large aggregate.
 - b. GGL-II Grind Grade Level II (Salt and Pepper Finish):
 - 1) Exposing the fine aggregate such as sand and small aggregate within the substrate. Generally, this level of grind can be achieved within 1/16 inch of the surface.
 - c. GGL-III Grind Grade Level III (Medium Aggregate):
 - Exposing more of the overall girth of the aggregate within the substrate. Generally, this level of grind can be achieved within 1/8 inch of the surface.
 - d. GGL-IV Grind Grade Level IV (Large Aggregate):
 - Exposing more of the overall girth of the aggregate within the substrate. Generally, this level of grind can be achieved within 1/4 inch of the surface.

3.3 INSTALLATION

A. General:

- 1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
- 2. In accordance with approved submittals.
- 3. In accordance with Regulatory Requirements.
- 4. Provide planetary heads and orbiting machinery for a consistent and unburnished polishing effect.

B. Layout:

- 1. Lines shall be straight and true, except otherwise indicated.
- 2. In accordance with approved joints and floor pattern.

C. Assistance:

- 1. Application shall be in direct consultation and review of the manufacturer.
- D. Floor Surface Polishing and Treatment:
 - 1. Integral Color: See Specification Section CAST-IN-PLACE CONCRETE.
 - 2. Provide polished concrete floor treatment in entirety of slab indicated by drawings. Provide consistent finish in all contiguous areas.
 - 3. Apply floor finish prior to installation of fixtures and accessories.
 - 4. Dyed and Polished Concrete:
 - a. Locate demarcation line between dyed surfaces and other finishes.

POLISHED CONCRETE FINISHING

- b. Polish concrete to final finish level.
- c. Apply selected diluted dyes to polished concrete surface in accordance with manufacturer's written recommendations.
- d. Allow dye to dry.
- e. Remove residue with dry buffer, reapply as necessary for desired result.
- f. Score pattern lines from 1/16 inch to 1/8 inch deep between color changes.
- 5. Stained and Polished Concrete:
 - a. Locate demarcation line between stained surfaces and other finishes.
 - b. Apply first coat of selected stain to concrete surface.
 - c. Allow stain to dry.
 - d. Apply second or third coat of selected stain (enough coats to match selected stain) to concrete surface.
 - e. Allow stain to dry.
 - f. Polish concrete to final finish level.
 - g. Remove residue with dry buffer, reapply as necessary for desired result.
 - h. Score pattern lines from 1/16 inch to 1/8 inch deep between color changes.
- 6. Apply Hardener / Sealer / Densifier as follows:
 - a. First coat at 250 ft²/gal. (or per manufacturer's written recommendations).
 - b. Second coat at 350 ft²/gal. (or per manufacturer's written recommendations).
 - c. Follow manufacturer's recommendations for drying time between successive coats.
- 7. Apply Oil Repellent Sealer as follows:
 - a. First coat per manufacturer's written recommendations.
 - b. Second coat per manufacturer's written recommendations.
 - c. Follow manufacturer's recommendations for drying time between successive coats.
- 8. "Diamond" grit-polish concrete floor surfaces with planetary/rotary power disc machine recommended by floor finish manufacturer. Sequence with coarse to fine diamond grit using dry method.
 - a. Comply with manufacturer's recommended diamond polishing grits for each sequence to achieve desired finish level. Level of sheen shall match that of approved mock-up.
 - b. Expose aggregate in concrete surface only as determined by approved mock-up.
 - c. All concrete surfaces shall be as uniform in appearance as possible.
- 9. Grind & polish perimeter and edges to match field. Hand tools and multiple passes may be required to achieve uniform finish. Visible change in finish from field finish will not be accepted.
- 10. Remove defects and re-polish defective areas.
- 11. Finish edges of floor finish adjoining other materials in a clean and sharp manner.

E. Burnishing

- 1. Utilizing a burnishing machine with 1,500 grit diamond impregnated pads, provide two (2) burnishings, requiring re-mobilization at the end of the project.
 - a. 1st Burnish Upon completion of floor surface polishing and treatment.
 - b. 2nd Burnish Just prior to occupancy / stocking / moving-in.

3.4 ADJUSTING

- A. Polish to higher gloss those areas not meeting specified gloss levels per mock-up.
- B. Fill joints greater than 1/8 inch deep flush to surface with color-matching material.
- C. Fill cracks greater than 1/8 inch deep flush to surface with color-matching material.

POLISHED CONCRETE FINISHING

3.5 CLEANING

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

3.6 PROTECTION

A. Protection from traffic:

1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 051200 - STEEL AND FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Steel and Fabrications, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 11 01 CONCRETE FORMWORK
 - 4. 03 15 14 DRILLED ANCHORS
 5. 03 20 00 REINFORCEMENT
 - 6. 03 30 00 CAST-IN-PLACE CONCRETE (Grouting of Bearing Plate)
 - 7. 06 10 00 ROUGH CARPENTRY
 - 8. 07 21 00 INSULATION
 - 9. 07 60 00 SHEET METAL
 - 10. 07 72 00 ROOF ACCESSORIES
 - 11. 08 11 00 METAL DOORS AND FRAMES
 - 12. 08 33 00 COILING DOORS
 - 13. 08 70 00 HARDWARE
 - 14. 09 50 00 ACOUSTICAL CEILINGS
 - 15. 09 67 23 RESINOUS FLOORING
 - 16. 09 91 00 PAINTING
 - 17. 10 05 00 MISCELLANEOUS SPECIALTIES
 - 18. 10 44 00 FIRE PROTECTION SPECIALTIES
 - 19. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

- 1. In accordance with Specification Section REGULATORY REQUIREMENTS and the following standards:
 - a. AISC: American Institute of Steel Construction "Specification for Design, Fabrication and Erection of Structural Steel buildings" and "Code of Standard Practice for Steel Buildings and Bridges" and "Recommended Procedure for Identification of High Strength Steels During Fabrication."
 - 1) NOTE: All connections shall be designed by the Structural Engineer and approved by DSA/SSS.
 - 2) NOTE: All connections shall be as shown in the Contract Document drawings.
 - 3) AISC: "Architecturally Exposed Structural Steel" 2016 AISC "Code of Buildings and Bridges," Section 10.
 - 4) AISC: "Specification for Structural Joists using ASTM A 325 or ASTM A 490 Bolts."

- 5) AISC: "Specification for Structural Steel Buildings" using the AISC 360-16.
- 6) AISC 341 Seismic Provisions.
- b. ANSI: American National Standards Institute:
 - 1) ANSI B18.22.1 "Plain Washers."
 - 2) ANSI B18.22.1 "Beveled Washers."
- c. ASTM: American Society for Testing and Materials.
 - 1) ASTM A 123: Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
 - 2) ASTM A 153: Standard Specification for Zinc (Hot-Dip) on Iron and Steel Hardware.
 - 3) ASTM A 385: Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
 - 4) ASTM A 780: Standard Specification for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- d. AWS: American Welding Society "Structural Welding Code."
 - 1) AWS D1.1 "Structural Welding Code."
 - 2) AWS D1.8 "Structural Welding Code Seismic Supplement".
 - 3) AWS A2.0 "Welding Symbols."
- e. EF: Engineering Foundation, "Specification for Structural Joints Using bolts from ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength."
- f. ICC: International Code Council
- g. NAAMM: National Association of Architectural Metal Manufacturers
 - 1) Metal Stairs Manual
 - 2) Pipe Rail Manual.
- RCSC: Research Council on Structural Connections, "Specification for Structural Joints" Using ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength."
- i. SSPC: The Society for Protective Coatings.
 - 1) SSPC-SP 1 "Solvent Cleaning."
 - 2) SSPC-SP 2 "Hand Tool Cleaning."
 - 3) SSPC-SP 3 "Power Tool Cleaning."
 - 4) SSPC-SP 6 "Commercial Blast Cleaning."
 - 5) SSPC-SP 7 "Brush-Off Blast Cleaning."

1.3 DEFINITIONS

- A. Welding Definitions:
 - 1. CVN Charpy V-Notch (Testing Procedure).
 - 2. FCAW Flux Core Arc Welding.
 - 3. FCAW-G Flux Core Arc Welding-Gas Shielded.
 - 4. FCAW-SS Flux Core Arc Welding-Self Shielded.
 - 5. G-MAW Gas Metal Arc Welding.
 - 6. SMAW Shielded Metal Arc Welding.
 - 7. SAW Submerged Arc Welding.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - 1) Submit Load Indicating Device information as indicated in Part 3 of this Specification Section, and include Laboratory Test Reports and other data to show compliance with Specification (include Specified Standards).
 - 2) Include certified copies of mill reports covering chemical and physical properties of each type of steel.
 - 3) Submit primer paint system. Obtain certification from the project's Painting Contractor and Paint Manufacturer that primer paint system is compatible with proposed painting systems for this project.
 - 2. Shop Drawings.
 - a. The Contract Drawings represent the spatial relationship as conceived by the Architect.
 - 1) The production of the structural steel Shop Drawings may require the employment and utilization of a 3-dimensional structural steel fabrication layout program to achieve the exact relationship of all intersecting members.
 - 2) Building sections and details represent interpretations of these relationships and the dimensions shown shall not be relied upon for accuracy and fit, but the Contractor / Structural Steel Fabricator shall verify them and double-check them for accuracy and fit.
 - 3) Any significant variations shall be submitted to the Architect and Structural Engineer for review and approval, of which the conditions may or may not require DSA review and approval.
 - 4) "Fit-Up" means and methods are the sole responsibility of the Contractor.
 - b. Provide all information necessary for the fabrication of component parts. Indicate size and weight of members, type and location of shop and field connections, size and extent of all welds, and welding sequence when required.
 - Include details of cuts, connections, camber, holes and other pertinent data.
 Include welds by Standard AWS Symbols, and show size, length and type of each weld.
 - d. Provide sections, drawings, templates and directions for installation of anchor bolts and other anchors.
 - e. Dimension requirements of structural steel for manufactured items, such as Mechanical Equipment, Dock Levelers, etc. All of these items shall be coordinated and provided by the General Contractor. The General Contractor shall also coordinate and provide dimensions to locate Structural Steel for Window Washing supports such as davits, tie-backs, etc.
 - 3. Samples.
 - Provide material samples cut and machined for testing without charge to the Owner.
 - 4. Quality Assurance/Control Submittals.
 - a. Test Reports:
 - 1) Submit mill analysis and test reports for each heat, in accordance with ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use," certifying conformity with the Specifications. Steel shall be identifiable in the fabricating shop.

- 2) Submit test reports for each lot of high strength bolts in accordance with ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" and ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength."
- 3) Submit Welding Procedure Specification (WPS) to the Structural Engineer for review prior to use.
 - a) For WPS's that have been qualified by test, the supporting Procedure Qualification Record (PQR) shall be submitted to the Structural Engineer for review prior to use.
- 4) Submit to the Structural Engineer for approval, a step by step welding sequence for the field welding of each type of connection.
- 5) Submit to the Structural Engineer a quality control plan that addresses all inspection issues, including in process and final inspection that are addressed in AWS D1.1.

b. Certificates:

- Submit current valid certificate issued by an independent testing agency for all welders, welding operators, and tack welders.
- 2) Certification of Welder's Qualifications: Welders that will make welds in restricted access, such as, but not limited to, the bottom flange-to-column welds through a cope hole or access hole in the beam web, shall be qualified by the Contractor using the same welding procedure as will be used for production and a mock-up assembly that simulates the construction configuration.
- 3) Provide Certified Mill Test Report Sheets in accordance with ASTM A123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products," certified at the plant after galvanizing, but prior to shipment.

5. Closeout Submittals:

- a. Project Record Documents in accordance with Specification Section PROJECT DOCUMENTS.
- b. Warranty.

1.5 QUALITY ASSURANCE

A. Qualifications:

- 1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - b. Welders shall be recently qualified by Test as prescribed in AWS "Structural Welding Code" for the type of welding to be performed.
 - 1) All welders, welding operators, and tack welders shall be qualified with the largest diameter electrode(s) to be used on the work by test and hold a current valid certificate issued by an independent testing agency, to perform the type of welds required by the work; including the process, position, and thickness of materials used (AWS D1.1: Clauses 3 & 4 Sections).
 - 2) In addition to meeting the requirements of AWS, welders that will make welds with restricted access, such as, but not limited to, the flange to column welds through a cope hole or access hole in the beam web, or where access to the bottom of a groove is restricted by the presence of a column flange, shall be qualified by the Contractor using the same welding procedure as will be used for production and a mock-up assembly that simulates the construction configuration.

- 3) All welders on the project shall be capable of understanding and following the requirements of the written WPS.
- 4) Each welder employed on the project shall understand all the requirements of this welding specification before welding on the project.
- 5) The written WPS shall be available to the welder, welding supervisor, and all inspectors.
- 6) Provide weld procedures for both pre-qualified welds and special welds to be submitted to the Owner's Testing laboratory and the Architect.

 Procedures shall be provided for both shop & field welds and shall be provided prior to commencing welding operations.

2. Manufacturer/Supplier Qualifications:

- a. Structural Steel firm experienced in successfully producing/supply capacity to produce/supply required units without causing delay in the Work.
- b. Provide documentation that the Hot-Dipped Galvanizer is a member in good association with the AGA (American Galvanizers Association).

B. Regulatory Requirements:

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

C. Mockups:

1. A typical mockup of welded connections shall be provided prior to shop fabrication.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Product Handling:

1. Store materials to permit easy access for inspection and identification. Keep steel members off the ground using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.

1.7 SCHEDULING

- A. Schedule the Work so that there will be no excessive inspection time. At all times that an inspector is required, sufficient work shall be laid out and adequate personnel supplied so that the Inspector's time will be used to full advantage. If inspection costs become excessive because of poor shop procedure, such excess costs will be paid for by the Owner, but deducted from the Contract Price. Poor procedures will be determined upon review of Inspection and/or Testing Reports. The rate for charging the excess costs will be as follows:
 - 1. Minimum of three (3) certified welders are used, Owner will pay 100 percent.
 - 2. Only two (2) certified welders are used, Contractor will be charged 1/3 of the Inspection cost.
 - 3. Only one (1) certified welder is used, the Contractor will be charged 2/3 of the inspection cost.

1.8 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES
 - a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

Plastic Steel Putty A.

- 2. Specified primer paint product manufacturer, or approved equivalent:
 - a. PPG PAINTS, INC.
- 3. Specified galvanized repair paint product manufacturer, or approved equivalent:
 - a. AERVOE INDUSTIRES, INC.
 - 1) Zinc Rich Galvanize

#1141.

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

2.2 MATERIALS

- A. Steel:
 - 1. Structural Shapes, Plates, and Bars: Shall be made in accordance with ASTM A 36, "Specifications for Carbon Structural Steel."
 - a. ASTM A 572, "Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel," Grade 50.
 - b. ASTM A 992, "Standard Specification for Steel for Structural Shapes for use in Building Framing" Grade 50.
 - 2. Pipe: Shall be in accordance with "Specifications for Welded and Seamless Steel Pipe," ASTM A 53 "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless," Grade B.
 - a. Finish: Type E, for concealed conditions, Black, except where indicated on the drawings to be galvanized.
 - b. Finish: Type S, for visually exposed conditions, Black, except where indicated on the drawings to be galvanized.
 - 3. Structural Tubes:
 - a. Cold-Formed tubing: Shall be in accordance with ASTM A 500 "Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes," Grade B.

- b. Hot-Formed tubing: Shall be in accordance with ASTM A 501 "Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing."
- c. All HSS sections (round and square) shall have their material certifications reviewed by the special inspector.
 - The special inspector shall verify that all seam welds are fused in accordance with ASTM A 500 "Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes," Grade B.
 - 2) The special inspector shall, as a minimum, visually inspect the exterior of all seam welds.
- B. Light Gage Cold Formed Shapes: In accordance with the following, unless otherwise noted on the Structural Engineer's Drawings:
 - 1. ASTM A 653 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process," such as "Zee" purlins, angles bent plated, etc.
 - 2. ASTM A 1011 "Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability."
- C. Plastic Steel Putty:
 - 1. Manufacturer: DEVCON.
 - 2. Material: Plastic Steel Putty "A".

2.3 COMPONENTS

- A. Fasteners shall be in accordance with the following, unless otherwise noted on the Structural Engineer's Drawings:
 - 1. Anchor Bolts:
 - a. All anchor bolts cast in concrete or masonry shall be headed bolts with cut threads conforming to:
 - 1) ASTM A 36 "Standard Specification for Carbon Structural Steel" or;
 - 2) ASTM A 572 "Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel" Grade 50 as indicated on drawings, or:
 - 3) ASTM F 1554 "Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength."
 - 2. Machine Bolts:
 - a. ASTM A 307 "Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength."
 - 3. Power Driven Fasteners: Tempered steel pins with special corrosive resistant plating or coating. Pins shall have guide washers to accurately control penetration. Fastening shall be accomplished by low-velocity piston-driven power activated tool. Pins and tool shall be as manufactured by Hilti Fastening Systems.
 - 4. Filler Metal and Welding Flux in accordance with AWS D1.1 Clause 5 "Fabrication Section", and AISC 360, Section A3.5, and shall meet a CVN Impact Energy of 20 ft-lbs at minus 20 Degrees F.
 - a. FCAW A5.20 or A5.29 E7XT-X.
 - b. G-MAW A5.18 or A5.28 E70S-X.
 - c. SAW A5.17 or A5.23 E7X-EXXX.
 - d. SMAW A5.1 or A5.5 E70XX Low Carbon.

2.4 FABRICATION

A. Shop Assembly:

- 1. Fabricate in accordance with AISC Spec and AISC Code unless otherwise indicated on Drawings or Specifications.
 - a. Mechanically curve specific Structural members as indicated on the drawings in accordance with AISC requirements and tolerances.
- 2. Fabricate all structural steel members and fittings.
- 3. Fabricate all miscellaneous metal fabrications scheduled in Part 3 of this Specification Section
- 4. Architecturally Exposed Structural Steel and "Exposed to View" Metal Fabrications:
 - a. Comply with AISC "Architecturally Exposed Structural Steel" 2010 AISC "Code of Buildings and Bridges," Section 10.
 - b. At all exposed joints, continuous fill with Plastic Steel Putty. Sand smooth and uniform and ready to receive finishes.
 - Clean all areas to have smooth seams with manufacturers recommended cleaner.
 - 2) Place Steel Putty and cure.
 - c. Also, refer to drawings.
- B. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with the AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated to provide the flattest floor possible. The contractor shall coordinate member tolerances with finishes.
 - 1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
 - 2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
 - 3. Columns:
 - a. All columns and beams shall adhere to Section M2.7 of the referenced "Specification for Structural Steel for Buildings" which states that completed members shall be free of twists, bends, and open joints.
- C. Connections: Weld or bolt shop connections, as indicated. Bolt field connections, except where welded connections or other connections are indicated.
- D. Unless noted otherwise, make holes 1/16 inches larger than the nominal bolt diameter.
 - 1. For anchor bolts, the hole diameter may not exceed the sizes indicated in CBC Section 2204A.4, nor what is specified on the drawings.
- E. Welding, Shop and Field: Weld by shielded arc method, submerged arc method, flux cored arc method, or other method approved by AWS. Perform welding in accordance with AWS Code. All welders, both manual and automatic, shall be certified in accordance with AWS "Standard Qualification Procedure" for the Work to be performed. See paragraph "welding" herein, for detailed requirements. If sizes of fillet welds are not shown on drawings, use AWS minimum weld size but not less than 3/16 inch fillet welds.
- F. Bolt Holes for Other Work: Provide holes required for securing other work to structural steel framing.

- 1. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.
- 2. Cut, drill or punch holes perpendicular to metal surfaces and remove all burrs. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.
- G. AISC Heavy Section shapes and built up members shall meet the requirements for joints in AISC Sections J1.5, J1.6, J2.7 and M2.2.
- H. High Strength Bolts:
 - 1. Installation and Tightening:
 - a. Handling and Storage of Fasteners: Fasteners shall be protected from dirt and moisture at the job site.
 - 1) Only as many fasteners as are anticipated to be installed and tightened during a work shift shall be taken from protective storage.
 - 2) Fasteners not used shall be returned to protected storage at the end of the shift.
 - 3) Fasteners shall not be cleaned of lubricant that is present in as-delivered condition.
 - b. Tension Calibrator: A tension measuring device shall be required at all job sites where bolts in slip-critical joints are being installed and tightened.
 - 1) The tension measuring device shall be used to confirm:
 - a) The suitability to satisfy the requirements of AISC for the complete fastener assembly, including lubrication if required to be used in the work.
 - b) Calibration of wrenches, if applicable, and
 - c) The understanding and proper use by the bolting crew of the method to be used.
 - 2) The frequency of confirmation testing, the number of tests to be performed and the test procedure shall be as specified in 1.d. below, as applicable.
 - a) The accuracy of the tension-measuring device shall be confirmed through calibration by an approved testing agency at least annually.
 - c. Joint Assembly and Tightening of Shear/Bearing Connections: Bolts in connections not within the slip-critical category shall be installed in properly aligned holes, but need only be tightened to the snug tight condition.
 - 1) The snug tight condition is defined as the tightness that exists when all plies in a joint are in firm contact.
 - 2) This may be attained by a few impacts of an impact wrench or the full effort of a man using an ordinary spud wrench.
 - 3) If a slotted hole occurs in an outer ply, a flat hardened washer or common plate washer shall be installed over the slot.
 - d. Joint Assembly and Tightening of Connections Requiring Full Pre-tensioning. Slip-critical connections shall be installed in properly aligned holes and tightened by one of the following methods.
 - 1) Turn-of-nut Tightening: When turn-of-nut tightening is used, hardened washers are not required except as specified in the AISC.
 - a) A representative sample of not less than three bolts and nuts of each diameter, length and grade to be used in the work shall be checked at the start of work in a device capable of indicating bolt tension.
 - b) The test shall demonstrate that the method of estimating the snug-tight condition and controlling turns from snug tight to be used by the bolting crews develops a tension not less than five percent greater than the tension required for slip-critical connections.

- 2) Installation of Alternate Design Bolts: A representative sample of not less than three bolts of each diameter, length and grade shall be checked at the jot site in a device capable of indicating bolt tension.
 - a) The test assembly shall include flat-hardened washers, if required in the actual connection, arranged as in the actual connections to be tensioned.
 - b) The calibration test shall demonstrate that each bolt develops a tension not less than five percent greater than the tension required by AISC.
 - c) Manufacturer's installation procedure shall be followed for installation of bolts in the calibration device and in all connections.
 - d) When alternate design features of the fasteners involve an irreversible mechanism such as yield or twist-off of an element, bolts shall be installed in all holes of the connection and initially brought to a snug tight condition.
 - e) All fasteners shall then be tightened, progressing systematically from the most rigid part of the connection to the free edges in a manner that will minimize relaxation of previously tightened fasteners prior to final twist-off or yielding of the control or indicator element of the individual fasteners.
 - f) In some cases, proper tensioning of the bolts may require more than a single cycle of systematic tightening.
- e. Mark bolts that have been completely tightened with an identifying symbol.
 - Final tightening of high strength bolts in webs of beam to column moment connections shall be performed after completion of flange welding.

I. Welding - General:

- 1. General: Quality of materials and design and fabrication of all welded connections shall conform to AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Building", "AWS Code for Welding in Building Construction", and requirements of this section.
 - a. Location and type of all welds shall be as shown. Make no other welded splices, except those shown on drawings, without prior approval of the architect.
- 2. Automatic Welding: Use electrode wire and flux for automatic and semi-automatic welding acceptable to Architect. All methods, sequences, qualification and procedures, including preheating, and post heating if necessary, shall be detailed in writing and submitted to the architect for review.
- 3. Qualification of Welders:
 - a. Structural steel welding: Manual and automatic welds for structural steel construction shall be made only by operators who have been previously qualified by tests, as prescribed in AWS D1.1 to perform type of work required.
 - b. Welders shall be checked by the welding inspector. Those not doing satisfactory work may be removed, and may be required to pass qualification tests again. All qualification testing shall be at the Contractor's expense.
 - c. Only welders whose weld procedures and pre-qualification by testing that have passed shall be considered qualified for such welds.
- 4. Control cooling process after weld is completed by either step down post heat or thermal blankets as determined by procedures and prequalification.
- 5. Box columns and built-up members shall have ultrasonic testing before and after welding.
- 6. Flame cut surfaces shall be ground to remove contaminated steel layer to provide welds proper fusion without impurities.
- 7. Preparation of surface: Surfaces to be welded shall be free of loose scale, slag, rust, grease, paint and any other foreign material.

welding inspector. Use equipment with suitable devices to regulate speed and manually adjust operating amperage and voltage. The amperage capacity shall be sufficient to overcome line drop, and to give adequate welding heat.

9. Remove runoff tabs and grind surfaces smooth where the tabs would interfere with

Welding equipment: Welding equipment to be used in each case shall be acceptable to

- 9. Remove runoff tabs and grind surfaces smooth where the tabs would interfere with fireproofing and architectural finishes.
- 10. End-welded studs:
 - a. Automatic end-welded studs: Automatically end-weld in accordance with the manufacturer's written recommendations in such a manner as to provide complete fusion between the end of the stud and the plates. There shall be no porosity or evidence of lack of fusion between the welded end of the stud and the plate. The stud shall decrease in length during welding approximately 1/8 inch for 5/8 inch, and 3/16 inch for 3/4 inch diameter. Stud sizes indicated on drawings represent the finish stud height.
 - b. Fillet-end welded studs: Studs may be welded using prequalified FCAW, GMAW, or SMAW processes provided the requirements of the AWS D1.1 Clause 7 "Stud Welding" are met as well as any other pertinent requirements of D1.1.
- 11. Provide mill camber as shown on the construction documents within AISC tolerance. Place mill tolerance upward for all beams specified no camber.

2.5 FINISHES

8.

A. Shop Cleaning:

- 1. Clean all surfaces of steel. Remove all rust, mill scale, deposits of splatter, slag or flux, oil, dirt, and all other materials.
 - a. Use hand tool, power tool, sandblasting, chemical cleaning, and any other method necessary to provide a smooth, sound surface.
- 2. Clean contact surfaces of high strength bolt of all burrs and material, which might prevent solid seating of the parts. Steel to receive bolts shall be primer painted except beneath the contact area of slip-critical bolts.

B. Shop Priming:

- 1. General:
 - a. "Painting of structural steel shall comply with the requirements contained in AISC 360. Painting of open-web steel joist girders shall comply with the requirements of SJI CJ-1.0, SJI JG-1.1, SJI K-1.1 and SJI LH/DLH-1.1. Individual structural members and assembled panels of cold-formed steel construction shall be protected against corrosion in accordance with the requirements contained in AISI S100. Protection of cold-formed steel light-frame construction shall also comply with the requirements contained in AISI S200", per CBC Section 2203A.1.
 - b. Shop prime all steel except the following:
 - 1) Surfaces embedded in concrete, or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 - 2) Contact surfaces for slip-critical (sc) high strength bolts.
 - 3) Surfaces within 2 inches of field welds.
 - 4) Top of structural support members when metal deck is welded to supports.
 - a) Primer is required when metal deck is mechanically attached to structural support members.
 - 5) Surfaces to receive sprayed-fire-resistive materials (applied fireproofing).
 - 6) Surfaces to be galvanized.
- 2. Priming:

- a. Immediately after surface preparation, apply primer according to manufacturer's written instructions and at a rate recommended by SSPC to provide minimum film thickness. Use priming methods that results in full coverage of joints, corners, edges and exposed surfaces.
 - 1) Strip paint corners, crevices, bolts, welds and sharp edges.
 - 2) Apply two shop prime coats to areas, which will be inaccessible after assembly or erection.
- Provide PPG PAINTS field primers; or approved equivalent, in accordance with Specification Section - SUBSTITUTION PROCEDURES. Should the Contractor substitute another paint company other than "PPG PAINTS" in Specification Section - PAINTING, then coordination of steel primers with finish coats specified in Specification Section - PAINTING is the Contractor's responsibility.
- c. Use the following shop painting systems on all normal environment interior steelwork:
 - 1) Surface Preparation: SSPC-SP2 "Hand Tool Cleaning" or SSPC-SP3 "Power Tool Cleaning."
 - 2) Application: Follow coating manufacturer's printed directions.
 - 3) Material: PPG PAINTS MULTI-PRIME 94-258 Primer.
 - 4) Number of Coats: One.
 - 5) Dry Film Thickness: 2.0 mils minimum.
 - 6) Volume Solids: 51.0 +/- 1.0% minimum.
 - 7) Generic Description: Modified Alkyd Resin Universal Primer.
- d. Use the following shop painting systems on all exterior steelwork and interior steelwork subjected to wet conditions or fumes.
 - Surface Preparation: SSPC-SP6 "Commercial Blast Cleaning."
 Application: Follow coating manufacturer's printed directions.
 - 3) Material: PPG PAINTS AMERCOAT 68HS Primer.
 - 4) Number of Coats: One.
 - 5) Dry Film Thickness: 5.0 mils minimum.
 - 6) Volume Solids: 78% +/-2%
 - 7) Generic Description: Reinforced Inorganic Zinc-Rich Urethane.

C. Hot-Dip Galvanizing:

- 1. Zinc coatings on iron and steel products in accordance with ASTM A 123 "Standard Specification for Zinc (Hot-Dip Galvanzied) Coatings on Iron and Steel Products."
 - a. Minimum thickness required shall be 3.9 mils.
 - b. All items that will be exposed to view (i.e. security fence, handrails, guard rails, awnings, canopies and shade structures left exposed to view), shall be Hot-Dipped Galvanized in accordance with ASTM A 385, "Standard Practice for Providing High-Quality Zinc Coatings (Hot-Dip)."
- 2. Zinc coatings on iron and steel hardware shall be in accordance with ASTM A 153 "Standard Specifications for Zinc Coating (Hot-Dip) on Iron and Steel Hardware."
- 3. Galvanized repair paint: High-Zinc-Dust-Content, in accordance with SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight paint for re-galvanizing welds and repair painting galvanized steel.

D. Stainless Steel Finishes:

- 1. Remove tool and die marks and stretch lines or blend into finish.
- 2. Grind and polish to produce uniform, directionally textured, polished surfaces without cross-scratches. Run grain with long dimension of each piece.
- 3. Bright Directional Satin Finish No.4, unless otherwise shown on drawings.
- 4. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.6 SOURCE QUALITY CONTROL

A. Fabrication Tolerances:

- "Architecturally Exposed Structural Steel", all steel for the Custom Steel Fabrications and miscellaneous "Metal Fabrications" that are subject to view are defined as "Exposed-to-View" joints. All joints that are "Exposed to View" shall be in accordance with AISC Code of Standard Practice, Section 10, "Architecturally Exposed Structural Steel".
 - a. All cope, miters and butt cuts in surfaces "Exposed-to-View" are made with uniform gaps of 1/8 inch if shown to be open joints, or in reasonable contact if shown without gap, in accordance with AISC Code of Standard Practice, Section 10.3.4.

B. Tests, Inspection:

- In accordance with Specification Section TESTING LABORATORY SERVICES and the following:
 - a. Materials shall be certified, identified and tested in conformance with CBC Table 1705A.2.1. Commercial stock steel shall be identified in accordance with CBC Table 1705A.2.1.
 - b. Complete four-sided inspection of all steel shall be made when required by Architect.
 - Tests and inspection of Shop and field welding in accordance with CBC Table1705A.2.1. Perform shop and field welding only under supervision of welding inspector.
 - 1) Welds shall be in accordance with CBC Table 1705A.2.1.
 - 2) Inspection:
 - a) Welding inspector shall be an AWS Certified Welding Inspector (CWI).
 - d. Tests & Inspection for High Strength Bolts in accordance with CBC Table 1705A.2.1.

2. Testing Laboratory:

- a. An inspection and testing laboratory will be selected by the Owner for testing and inspection as required by the Contract Documents. The selected laboratory shall conform to the requirements of ASTM E 329 "Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction." Documentary evidence of such conformance shall be submitted to the Owner and the Governing Agency.
- b. All materials, work, methods and equipment shall be subject to inspection at the mill, fabricating plant and at the building site. Material or workmanship not complying fully with the Contract Documents will not be accepted. The Contractor shall give the Testing Laboratory reasonable notice when ready for inspection and shall supply samples and test pieces and all facilities for inspection without extra charge. The Owner will assume the expense of making the tests and inspection except as otherwise specified in Division 1.
- 3. Cost of Testing and Inspection: Costs of testing and inspection of structural steel, except as specified hereunder and in Division 1, will be paid for by the Owner.
 - a. All transportation costs and per diem living costs for inspection at fabricator's plant further than 75 miles from the job site will be back-charged to the Contractor.
 - b. It is assumed that all fabrication will take place in one shop location only. All additional inspection costs will be back-charged to the Contractor.
 - c. All mill tests and costs or re-test of plain materials shall be at the expense of the Contractor.

- d. Costs of tests required due to Contractor's failure to provide steel identifiable in accordance with the indicated ASTM designation shall be at the expense of the Contractor.
- 4. Structural Steel Testing and Inspection:
 - a. If structural steel tests are indicated as required on the structural drawings, one tension and one bend test shall be made for each size of structural shape, plate and for each tube and pipe size. Tests to be made in accordance with requirements of appropriate ASTM designations.
 - b. If structural steel tests are not indicated as required on the structural drawings, then for shapes, plates, bars, pipe and tubing, manufacturer's certified mill test reports and analysis for each heat will be acceptable for steel identifiable in accordance with indicated ASTM designation. Mill test reports shall indicate the physical and chemical properties of all structural steel used. Correlate individual heat numbers with each specified structural section.
 - c. Unidentifiable Steel:
 - 1) For Fy less than or equal to 36.0 ksi: Provide one tension and elongation test and one bend for each 5 tons or fraction thereof for each size.
 - 2) For Fy greater than 36.0 ksi: Provide one tension and elongation test and one bend or flattening for each piece.
 - d. Costs of re-tests and additional testing required by the use of unidentifiable steels shall be the Contractor's responsibility. Additional costs of testing incurred by the Owner shall be deducted from the Contract Final Payment.
- 5. Expansion Anchors: Load test as indicated on the drawings.
- 6. Welding Inspection:
 - a. If shop or field welding inspection is indicated on the structural drawings, all shop and field welded operations shall be inspected by a qualified welding inspector employed by the Testing Laboratory. Such Inspector shall be a person trained and thoroughly experienced in inspection of welds. The inspector's ability to distinguish between sound and unsound welding will be reliably established.
 - b. The Welding Inspector shall make a systematic record of all welds. This record shall include:
 - 1) Identification marks of welders.
 - 2) List of defective welds.
 - 3) Manner of correction of defects.
 - c. The welding inspector shall check the material, equipment and procedure, as well as the welds. He/she shall also check the ability of the welder. He/she shall furnish the Architect with a report, duly verified by him/her that the welding which is required to be inspected is proper, and has been done in conformity with the Contract Documents, and that he/she has used all means to determine the quality of the welds.
 - d. All full penetration groove welds shall be subject to ultrasonic testing, as per AWS D1.1, Clause 6 "Inspection, Part "C", Ultrasonic Testing of Groove Welds." All defective welds shall be repaired and re-tested with ultrasonic equipment at the Contractor's expense.
 - e. Column Flanges: An area extending 6 inches above and below point where girder flanges area attached shall be inspected. Column flange edges shall be inspected visually, and entire area ultrasonically for lamination, plate discontinuities, and non-metallic inclusions.
 - f. All partial penetration groove welds shall be tested by ultrasonic testing.

- g. When ultrasonic indications arising from the weld root be interpreted as either a weld defect or the backing strip itself, the Engineer shall be notified. The Engineer may require the removal of backing strip. The backing strip shall be removed at the expense of the Contractor, and if no root defects are visible the weld shall be re-tested. If no defect is indicated on this re-test, and no significant amount of base and weld metal have been removed, no further repair of welding is necessary. If a defect is indicated, it shall be repaired and re-tested at the Contractor's expense.
- h. The ultrasonic instrumentation will be calibrated by the technician to evaluate the quality of the welds in accordance with AWS D1.1.
- i. Other methods of inspection, for example, X-ray, gamma ray, magnetic particle, or dye penetrant, may be used on welds if felt necessary by the inspection laboratory, and with the approval of the Engineer.
- j. Base metal thicker than 1-1/2 inches, when subjected to through thickness weld shrinkage strains, shall be ultrasonically inspected for discontinuities directly behind such weld before and after joint completion.
- k. End-welded studs shall be sampled, tested, and inspected per the requirements of the Structural Welding Code Steel D1.1, published by the American Welding Society.
- 1. At the discretion of the Owner's testing agency, the ultrasonic testing frequency may be reduced but may not be less than the following:
 - 1) Initially, all welds requiring ultrasonic testing will be tested at the rate of 100 percent in order to establish the qualifications of each individual welder. If the reject rate is demonstrated to be less than 5 percent of the welds tested for each welder, then the frequency of testing for that welder may be reduced to 25 percent. If the reject rate increases to 5 percent or more, 100 percent testing will be re-established until the rate is reduced to less than 5 percent. The percentage of rejects will be calculated for each welder independently.
- m. A sampling of at least 40 completed welds will be made for such reduction evaluation. Reject rate is defined as the number of welds containing rejected defects divided by the number of welds completed. For evaluating the reject rate of continuous welds over 3' in length, each 12 linear inch increment of welds, 1 inch or less in thickness, will be considered as one weld. For evaluating the reject rate of continuous welds greater than 1 inch thickness, each 6 linear inches will be considered one weld.
- 7. High Strength Bolting Tests and Inspection:
 - a. Furnish certified test reports for each lot of bolts in accordance with Section 9 of ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength". Install bolts under the supervision of a qualified inspector in accordance with Section 9, Research Council "Specifications for Structural Joints using bolts for ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength".
 - b. If high strength bolting inspection is indicated or required on the structural drawings, the testing laboratory will visually inspect all high strength bolts.
 - c. While the work is in progress, the Project Inspector shall determine that the requirements of this Specification are met in the work. The Project Inspector shall observe the calibration procedures and shall monitor the installation of bolts to determine that all plies of connected material have been drawn together and that the selected procedure is properly used to tighten all bolts.

- 1) In addition to the requirement of the foregoing paragraph, for all connections specified to be slip critical (SC), the Project Inspector shall assure that the specified procedure was followed to achieve the pretension specified in the AISC. The pre-tension shall be verified by the Project Inspector for these bolts.
- 2) Bolts in connections identified as not being slip-critical nor subject to direct tension need not be inspected for bolt tension other than to ensure that the piles of the connected elements have been brought into snug contact.

C. Verification of Performance:

- 1. Testing Agent shall be a qualified person or Testing Laboratory listed and approved by DSA/SSS and selected by the Architect, and the Owner.
- 2. Testing Agent shall make Test and Inspection Reports certifying materials and workmanship to conform with Drawings and Specifications.
 - a. Cost of Testing and Inspection will be paid by Owner unless otherwise specified.
 - b. Cost of cutting and machining test samples shall be paid by Contractor.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with 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 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. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
 - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Employ a licensed land surveyor for accurate erection of structural steel.
 - 1. Check elevations of bearing surfaces (concrete or masonry), and locations of anchor bolts and similar devices, before erection work proceeds.
 - 2. Report discrepancies to Architect.
 - 3. Do not proceed with erection until corrections have been made or until compensating adjustments to structural steel work have been agreed upon with the Architect.
- B. Erect all Structural Steel frame work in accordance with AISC Specifications "Specification for the Design, Fabrication and Erection of Structural Steel for Building," latest edition, and AISC Code unless otherwise indicated on Drawings or Specification.

- 1. Framing: Carry up framing true and plumb. Provide temporary bracing wherever necessary to support all loads to which the structure may be subjected, including erection equipment and its operation. Leave bracing in place as long as may be required for safety. As erection progresses securely connect the work to take care of all dead load, wind and erection stresses.
- 2. Connections:
 - a. Machine Bolts shall be installed with cut washer under nut.
 - b. High Strength Bolts shall be used to assemble structural joints in accordance with AISC "Specification for Structural Joints using bolts for ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength," unless otherwise indicated on the drawings.
 - 1) Tighten nuts for Bolts in accordance with CBC Sections 1705A.2.1. Load Indicating Devices shall be pre-approved by the DSA/SSS, and certification by an independent testing laboratory stating that the devices meet AISC Specifications shall be submitted to Project Engineer and DSA/SSS.
 - 2) Manufacturer shall also submit installation procedures prior to incorporation into the work for approval by the Project Engineer.
 - Once approved, manufacturer's installation instructions shall be followed for all conditions. Mark bolts that have been completely tightened with an identifying symbol.
 - 4) Connections shall be slip-critical (SC) type.
 - a) Slip-critical connections, surfaces shall be in accordance with AISC "Specification for Structural Joints Using bolts for ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength."
 - 5) Contacting surfaces shall be painted, except for friction-type (SC) connections.
 - 6) Provide washers in accordance with ASTM A 325 "Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength" or ASTM A 490 "Standard Specification for Heat-Treated Steel Structural Bolts, 150 ksi Minimum Tensile Strength."
 - c. Welding: The details of all joints, the technique of welding employed, the appearance and quality of welds made, and the methods used in correcting defective work shall conform to "AISC Specs," "AWS Code," Table 1705A.2.1.
 - 1) All "exposed-to-view" welds will be smooth and flush with no voids showing and still be in conformance with standards referenced herein.
 - 2) All exposed to view butt welds shall be flush as connected members will allow. Minor defects and transitions in metal surfaces shall be filled and sanded out with an approved metal filler prior to painting.
 - 3) Exposed fillet welds are acceptable "as is" provided the surface chevrons are shallow and have no abrupt protrusions.
- 3. Cutting Holes: The use of a cutting torch is permissible only if the metal being cut is not carrying stress during the operation and only with the prior approval of the Architect and DSA/SSS for each specific condition.
- 4. Setting Plates: Set column base plates and leveling plates to correct elevations and temporarily support on steel wedges or shims until the supported members have been plumbed, locked in place and grouted.
- C. Erection Sequence: Erect steel in accordance with special erection sequences where special erection sequences are indicated on the contract documents.

- D. Before and during erection, keep all structural steel clean. Ship, handle and store steel in a manner to avoid injury to members. Steel members showing evidence to rough handling or injury will be rejected.
- E. Mark each member with erection identification corresponding to mark shown on erection drawings. Carefully plan erection of structural steel so that no cutting and removal of material will be necessary. Do not torch burn in the field, unless specifically permitted by Engineer.
- F. Provide sufficient bracing, shoring and guys to effect safe and satisfactory erection. Provide bracing and shoring capable of holding steel work plumb and properly aligned while field connections are being made, and until lateral force resisting elements are deemed by the Architect to be capable of bracing structure. Temporary bracing shall be adequate to resist lateral forces from wind or seismic prior to the completion of the lateral resisting system.
- G. Set bearing and base plates with extreme care. Bring level, to line and grade with leveling plates or by leveling nuts and bolts. Grout solid under plates with a flowable non-shrink grout per Specification Section CAST-IN-PLACE CONCRETE prior to applying vertical load.
- H. Field Assembly: Set structural framing accurately to the lines and elevations indicated. Align and adjust the various members forming a part of a complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces which will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Shimming or other adjustments not indicated on drawings shall be approved by the Engineer prior to installation. Level and plumb individual members of the structure within specified AISC tolerances except as noted herein. Column shimming shall be 1/4 inch.
- I. All welds shall be full and clean, and conform to AISC and AWS Specifications.
- J. Erection Tolerances: Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 1. Individual pieces shall be erected so that the deviation from plumb, level and alignment shall not exceed 1 to 500 plus:
 - 2. The maximum displacement of the center-line of columns adjacent to elevator shafts, from the established column line, shall not be more than 1 inch at any point from the established column line in the first 20 stories.
 - 3. In order to provide a true, flat plane for the exterior elevations, install all steel framing at the exterior walls of the building, so that the center lines of such framing does not vary by more than 1 inch for the length of the building.
 - a. Also, install each vertical member on such grids so that its vertical center-line does not vary by more than 1/2 inch from a vertical line for each story and 1 inch for its full height.
 - 4. Take special care that column base plates are parallel and perpendicular to faces of columns and that bolt holes are accurately placed.

K. Hoisting And Bracing:

- 1. Provide all hoisting and erecting equipment and power.
- 2. Provide and maintain any and all safety railings, toe boards, etc., required for the erection of steel framing and metal decking.
- 3. Brace the erected frame in a manner which will assure safety and proper alignment to receive the metal decking and until the concrete slabs have been poured and have set.

4. Erect building frame true and level. Erect columns in a manner to allow for movement due to welding shrinkage and thermal expansion and contraction of framing. Check for plumb after erection of each level. Maintain structural stability of frame during erection. Provide temporary bracing where necessary to maintain frame stability and to support required loads, including equipment and its operation.

3.4 CONSTRUCTION

A. Special Techniques:

- 1. Architecturally Exposed Structural Steel and "Exposed to View" Metal Fabrications.
 - a. At all exposed joints, continuous fill with Plastic Steel Putty. Sand smooth and uniform and ready to receive finishes.
 - 1) Clean all areas to have smooth seams with manufacturers recommended cleaner.
 - 2) Place Steel Putty and cure.

3.5 REPAIR / RESTORATION

- A. Defective Work shall be immediately replaced with proper work. Such replaced Work and the Testing and Inspection for it shall be at the expense of the Contractor. If defects or damages cannot be corrected in the field, the material shall be returned to the shop or new parts furnished, as the Architect directs, and the Contractor shall pay all costs therefor.
 - 1. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780 "Practice for Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings."
 - 2. Primer Coat On all hot-dip iron or steel that needs repair, provide one primer coat of the following:
 - a. Zinc Rich Galvanize No. 1141 by AERVOE INDUSTRIES, INC., or approved equivalent.
 - b. Provide a smooth-flowing, high-solids compound that provides a fast-drying coating that protects ferrous metals in highly corrosive environments. Coating shall be 97% pure zinc metallic flake, which leaves 94% zinc in the dry film.
 - c. Overall Dry Film Thickness: 2.0 mil.
 - 3. Finish Coat On all hot-dip iron or steel that needs repair, provide one finish coat over a properly cured primer coat of the following:
 - a. Zinc Rich Galvanize No. 1141 by AERVOE INDUSTRIES, INC., or approved equivalent.
 - b. Provide a smooth-flowing, high-solids compound that provides a fast-drying coating that protects ferrous metals in highly corrosive environments. Coating shall be 97% pure zinc metallic flake, which leaves 94% zinc in the dry film.
 - c. Overall Dry Film Thickness: 2.0 mil.
- B. Touch-up Primer Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop priming to comply with SSPC-PA1 "Touching Up Shop-Painted Surfaces."
 - 1. Clean and prepare surfaces by SSPC-SP 2 "Hand-Tool Cleaning" or SSPC-SP 3 "Power-Tool Cleaning."

3.6 FIELD QUALITY CONTROL

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

B. Tests, inspection:

- 1. As required by Regulatory Requirements.
- 2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
- 3. No work shall be without the inspections required by Regulatory Requirements.
- 4. Tests and inspection of field welding in accordance with CBC Table 1705A.2.1. Perform field welding only under supervision of welding inspector.
 - a. Welds shall be in accordance with CBC Table 1705A.2.1.
 - b. Inspection shall be in accordance with CBC Table 1705A.2.1.
 - 1) Welding inspector shall be an AWS Certified Welding Inspector (CWI).

C. Verification of Performance:

- Certification:
 - a. The Contractor shall engage and pay for a registered Civil Engineer or Licensed Land Surveyor to check the alignment, plumbness, elevation, and overall accuracy of the erected framing at appropriate stages during construction and at completion of erection.
 - b. Civil Engineer or Licensed Land Surveyor shall submit written verification and certification that the entire installation is in accordance with the Contract Documents.

3.7 SCHEDULES

- A. Metal Fabrication Schedule should be used as a guide only and is not considered as a complete list. Refer to Drawings for location and details:
 - 1. Miscellaneous backing members, brackets, and supports for work installed by other trades.
 - 2. Ladder
 - 3. Lintels

END OF SECTION

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to complete all rough carpentry, accessories and other related items necessary to complete the Project as indicated by the Construction Documents unless specifically excluded.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 11 01 CONCRETE FORMWORK
 - 4. 03 15 14 DRILLED ANCHORS
 - 5. 03 30 00 CAST-IN-PLACE CONCRETE
 - 6. 05 12 00 STEEL AND FABRICATIONS
 - 7. 06 41 23 MODULAR CASEWORK
 - 8. 07 21 00 INSULATION
 - 9. 07 51 13 BUILT-UP ROOFING
 - 10. 07 60 00 SHEET METAL
 - 11. 07 72 00 ROOF ACCESSORIES
 - 12. 07 92 00 SEALANTS
 - 13. 08 11 00 METAL DOORS AND FRAMES
 - 14. 08 31 13 ACCESS DOORS AND FRAMES
 - 15. 08 33 00 COILING DOORS
 - 16. 08 70 00 HARDWARE
 - 17. 09 24 00 CEMENT PLASTER
 - 18. 09 29 00 GYPSUM BOARD
 - 19. 09 30 00 TILE
 - 20. 09 50 00 ACOUSTICAL CEILINGS
 - 21. 09 65 10 RESILIENT BASE AND ACCESSORIES
 - 22. 10 05 00 MISCELLANEOUS SPECIALTIES
 - 23. 10 14 00 IDENTIFYING DEVICES
 - 24. 10 28 13 TOILET ACCESSORIES
 - 25. 10 44 00 FIRE PROTECTION SPECIALTIES
 - 26. 10 51 13 METAL LOCKERS
 - 27. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

- 1. In accordance with the following standards:
 - a. ALSC American Lumber Standards Committee
 - b. ANSI American National Standards Institute
 - c. APA The Engineered Wood Association (Formerly the American Plywood Association)
 - d. ASME American Society of Mechanical Engineers International
 - e. AWPA American Wood Protection Association
 - f. CABO Council of American Building Officials

g.	FS	Federal Specification
h.	ICC	International Code Council
i.	NDS	National Design Specification for Wood Construction
j.	NIST	National Institute of Standards and Technology
k.	PS	Product Standards of the U.S. Department of Commerce
1.	RIS	Redwood Inspection Service
m.	WCLIB	West Coast Lumber Inspection Bureau
n	WWPA	Western Wood Products Association

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - Product Data:
 - a. Submit manufacturer's data for Wood-Preservative Treatment.
 - b. Submit manufacturer's data for Fire-Retardant Treatment.
 - c. Submit manufacturer's data for power driven fasteners, metal-framing connectors, and metal framing anchors.
 - 2. Quality Assurance/Control Submittals:
 - a. Material Certificates: Submit Material Certificates of Compliance to Standards and Regulatory Requirements.

1.4 QUALITY ASSURANCE

A. Qualifications:

- 1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
- B. Regulatory Requirements:
 - 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

C. Meetings:

- 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver undamaged products to project site in manufacturer's sealed containers or bundles with tags and labels intact.

B. Storage and Protection:

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

1.6 PROJECT CONDITIONS

A. Environmental Requirements:

- 1. Dust Control: Perform work in a manner as to minimize the spread of dust and flying particles.
- 2. Burning: No burning will be allowed on-site.
- 3. Rain: Work under this section shall not be started or maintained under threat of rain unless the work is not affected by the rain.

B. Existing Conditions:

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

1.7 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES
 - a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Power Driven Fastener specified product manufacturer:
 - a. HILTI FASTENING SYSTEMS.
 - 2. Metal Framing Anchor specified product manufacturer:
 - a. SIMPSON STRONG-TIE COMPANY.
 - b. Acceptable alternative manufacturers:
 - Manufacturers of Alternative Metal Framing Anchors shall have Model Code Research Evaluation Reports and Published allowable design loads that are determined from empirical data, or by rational engineering analysis, that are demonstrated by comprehensive testing performed by a qualified testing agency acceptable by the Architect or its Designated Design Consultant, and DSA.
 - 3. Metal Timber Framing Connector specified product manufacturer:
 - a. SIMPSON STRONG-TIE COMPANY.
 - b. Acceptable alternative manufacturers:
 - Do not substitute connectors manufactured by others than SIMPSON STRONG-TIE COMPANY without prior written review by the Architect or its Designated Design Consultant, and DSA.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Wood:
 - 1. Douglas Fir Larch:
 - a. Standards and Requirements: In accordance with WCLIB "Standard Grading and Dressing Rules" No. 17, latest edition, and WWPA "Western Lumber Grading Rules•," latest edition.
 - 1) All wood shall be "DRY" and having a moisture content of less than 19 percent at the time of installation, in accordance with WWPA.
 - 2) Provide wood of S4S unless otherwise noted.
 - 3) Factory mark each piece of wood with the grade stamp of the grading agency.
 - b. Grading and Use Requirements:

Item	Sizes	Grade	Maximum Moisture Content at Initial Use (Installation)
Studs	2x	No. 1	19%
Studs	3x, 4x, 6x	No. 1	19%

Item	Sizes	Grade	Maximum Moisture Content at Initial Use (Installation)			
Sills & Plates	2x	No. 1	19%			
Sills & Plates	3x, 4x, 6x	No. 1	19%			
Beams	4x, 6x	No. 1	19%			
Joists	2x	No. 1	19%			
Posts	4x, 6x, 8x	No. 1	19%			
Ledgers	2x	No. 1	19%			
Ledgers	3x, 4x, 6x	No. 1	19%			
Blocking	2x, 3x, 4x, 6x	No. 1	19%			
Sheathing and Stripping	Up to 1-1/2" thick 2" width and wider	No. 1	19%			
Stripping	2x, 3x, 4x, 6x	Construction	19%			
Nailers & Grounds	2x, 3x, 4x, 6x	Construction	19%			
Furring	2x, 3x, 4x, 6x	Construction	19%			
T & G Decking	2x	Select Dex	15%			

- 1) Initial use shall be that point at which screws or other fasteners or the holes for said fasteners are installed into the wood.
- 2) The Contractor shall use whatever means necessary, including site drying to ensure that the moisture contents listed above are not exceeded.

B. Plywood:

- 1. Soft Plywood:
 - a. Standards and Requirements: In accordance with PS1-09, Group 1 Douglas-Fir and PS2-10.
 - 1) Factory mark each piece of plywood with the APA Grade Stamp.
 - 2) Maximum Moisture Content at Initial Use (Installation) shall be 15 percent.
 - b. Grading and Use Requirements:
 - 1) Wall, Roof, and Parapet Sheathing:
 - a) APA Rated Sheathing Structural 1.
 - b) Span Rating as required to suit stud or joist spacing.
 - c) Exposure Durability Classification Exposure 1.
 - d) Species Group 1.
 - e) Grade C-C 3 ply for 1/4 inch thickness and C-D 5 ply for 1/2 and 5/8 inch thickness.
 - 2) Subflooring, Floor Sheathing as underlayment, Equipment Platform Sheathing:
 - a) APA Rated "Sturdi-Floor."
 - b) Span Rating as required to suit joist spacing.
 - c) Exposure Durability Classification Exposure 1.
 - d) Species Group 1.
 - e) Grade C-C plugged.
 - 3) Backing panels for Electrical Equipment.
 - a) APA Rated Sheathing Structural 2.
 - b) Exposure Durability Classification Exterior.
 - c) Species Group 1.
 - d) Grade C-C.
 - e) Shall be 3/4 inch minimum thickness.
 - 4) Backing panels for Telecommunication Equipment:
 - a) APA Rated Sheathing Structural 2.
 - b) Exposure Durability Classification Exterior.
 - c) Species Group 1.

- d) Grade A-B.
- e) Shall be 3/4 inch minimum thickness.

2.3 FINISHES

A. Preservative Treatment:

- 1. Pressure Treat Wood and Plywood, with CARB Complying, EPA Registered, preservatives in accordance with AWPA Standards "U," "T," and "P."
 - a. Do not use material that does not comply with the requirements for untreated material.
 - b. After treatment, kiln-dry wood to a maximum moisture content of 19 percent.
 - c. After treatment, dry plywood to a maximum moisture content of 15 percent.
 - d. Factory mark each treated item with the treatment quality mark of an Independent Inspection Agency approved by the ALSC Treated Wood Program.
- 2. Non-pressure treat Wood and Plywood, with CARB Complying, EPA Registered preservatives in accordance with AWPA Standards "U•,""T,""P,"• and "N."

B. Fire Retardant Treatment:

- 1. Fire Retardant Treat Wood and Plywood with pressure treatment materials that comply with performance requirements of CBC 2303.2.
 - a. Use Exterior Type.
 - b. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures when tested by a qualified independent testing agency and is acceptable to Fire and Life Safety authorities.
 - c. Use treatment that does not promote corrosion of metal fasteners.
 - d. After treatment, kiln-dry wood to a maximum moisture content of 19 percent.
 - e. After treatment, dry plywood to a maximum moisture content of 15 percent.
 - f. Factory mark each treated item with the treatment quality mark of an Independent Inspection Agency.

2.4 ACCESSORIES

- A. Fasteners: All types shall comply with standards and dimensions of the latest edition of NDS. All types of fasteners exposed to wet or exterior conditions, in-ground contact, in pressure or preservative treated woods, in concrete or masonry, or in an area of high relative humidity shall be hot-dipped galvanized in accordance with ASTM A 153 "Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware."
 - 1. Nails: Common wire nails or spikes complying with ASTM F 1667 "Specification for Driven Fasteners: Nails, Spikes, and Staples," and CBC Section 2304.10. Box nails and sinker nails are not permitted. Vinyl coating is permitted on common nails.
 - 2. Bolts: Steel bolts complying with ASTM A 307 "Specification for Carbon Steel Bolts and Standards, 60,000 PSI Tensile Strength," Grade A, hex head.
 - a. Provide hex head nuts complying with ASTM A 307 "Specification for Carbon Steel Bolts and Standards, 60,000 PSI Tensile Strength," and standard flat washers complying with ANSI/ASME B18.22.1, Type A, Wide pattern.
 - 3. Lag Bolts: Shall comply with ANSI/ASME B18.2.1, hex head.
 - a. Provide standard flat washers complying with ANSI/ASME B18.22.1, Type A, Wide pattern.
 - 4. Wood Screws: Shall comply with ANSI/ASME B18.6.1.

- a. Screws for fastening wood to Metal Framing shall comply with ASTM C 954 "Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness."
- 5. Power Driven Fasteners: Tempered Steel pins with corrosive resistant plating or coating complying with ICC ESR-1539.
- B. Metal Framing Anchors: All anchors shall comply with ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process," G60 Coating Designation for hot-dipped zinc-coated steel sheet. Provide structural, commercial, or lock-forming quality as standard with manufacturer for type of anchor indicated.
- C. Metal Timber Framing Connectors: All connectors shall have specific ICC Approval and be fabricated from hot-dipped galvanized steel.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
 - Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
 - 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 - 3. Execution of work under this specification section shall constitute acceptance of existing conditions.
 - 4. Verify that work under this Section may be performed in strict accordance with the original design and all pertinent codes and regulations.

3.2 PREPARATION

A. Coordination:

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

B. Protection:

1. Protect all materials from damage occurring from work called for under this specification section.

C. Preservative Treatment:

- 1. Members requiring pressure treatment:
 - a. Sills, Plates, Ledgers, Studs, Joists, Blocking, Nailers and Furring attached or resting on or against concrete or masonry construction.
 - b. Pressure treated members cut in the field shall have the cut ends painted with preservative until the wood or plywood absorbs no more preservative.
- 2. Members requiring field treatment:
 - a. All wood and plywood members at exterior walls within two feet of the ground surface.
 - b. Treat all surfaces of the member.

- Treat by dipping the required portion of the member into preservative for 15 minutes or paint until the wood or plywood absorbs no more preservative. Wait a minimum of two hours after dipping or painting is complete to incorporate member into project.
- d. Test treat items for compatibility where additional finish coats (stain or paint) may occur.

D. Fire Retardant Treatment:

c.

- All wood and plywood members as indicated.
- 2. All plywood panels for Telecommunication Equipment.

3.3 **INSTALLATION**

A. General:

- 1. In accordance with manufacturer's instructions and recommendations unless specifically noted otherwise.
- 2. In accordance with approved submittals.
- In accordance with Regulatory Requirements. 3.
- Selection of wood and plywood pieces: 4.
 - Carefully select all members.
 - Select individual pieces so that knots and obvious defects will not interfere with b. placing bolts, proper nailing, and making proper connections.
 - Cut out and discard all defects which will render a piece unable to serve its c. intended function.
 - d. Wood and plywood may be rejected by the Architect or its Designated Design Consultant, and DSA whether or not it has been installed for excessive warp, twist, bow, crook, mildew, fungus, or mold as well as for improper cutting, fitting and treatment when required.
- 5. All wood and plywood shall be accurately cut to lengths required.
- All work shall produce joints true, tight, level, plumb, and all members are securely 6. anchored.
 - Do not shim any framing member. a.

B. Layout:

1. Lines shall be straight and true.

C. Fastening:

- Nails: 1.
 - All nailing shall be as required by CBC Table 2304.10.1 "Fastening Schedule." a.
 - Machine nailing may be approved subject to the approval of the Architect or its b. Designated Design Consultant, and DSA.
 - The use of machine nailing is subject to a satisfactory job site demonstration 1) for each project. The approval is subject to continued satisfactory performance.
 - 2) In plywood, if the nail heads penetrate beyond flush with the surface of the sheathing, or if minimum allowable edge distances are not maintained, the performance will be deemed unsatisfactory.
 - Machine nailing will not be accepted in 5/16" plywood.
 - Penetration of nails or spikes shall be one-half the length of the nail or spike into c. the piece receiving the point.
 - 16d nails shall be used to connect pieces 2" in thickness unless otherwise indicated. d.
 - Clinch nails protruding through members. e.
 - Bore holes for nails where necessary to prevent splitting. f.

- g. Use Finish or Casing Nails for finish work.
- 2. Lag Bolts:
 - a. Lag Bolts shall be screwed into place. No driving is allowed.
 - b. For the Shank portion, holes shall be bored the same depth and diameter as the shank. For threaded portion, holes shall be between 60% and 75% of the shank diameter.
 - c. Malleable Iron or Steel plate washers shall be used where bolt heads bear on wood or plywood. Washers shall have an area equal to 16 times the area of the bolt.
 - 1) Steel plate washers shall have a thickness not less than 1/10 the length of the washer's longest side.
 - 2) Malleable Iron washers shall have a bearing surface for the head equal in diameter to not less that the long diameter of the head.
 - d. Tighten all bolts and screws prior to concealing within structure.
- 3. Bolts:
 - a. Holes shall be 1/16" larger than bolt diameter.
 - b. Malleable Iron or Steel plate washers shall be used where bolt head and nuts bear on wood or plywood. Washers shall have an area equal to 16 times the area of the bolt.
 - 1) Steel plate washers shall have a thickness not less than 1/10 the length of the washer's longest side.
 - 2) Malleable Iron washers shall have a bearing surface for the head or nut equal in diameter to not less that the long diameter of the head or nut.
 - c. Tighten all bolts prior to concealing within structure.
- 4. Power Driven Anchors
 - a. Fastening shall be accomplished by low-velocity piston-driven power activated tool.
 - b. Pins shall have guide washers to accurately control penetration.
- 5. Expansion Anchors (Post-Installed Concrete Anchors):
 - a. Refer to Specification Section DRILLED ANCHORS.
- 6. Metal Framing Anchors
 - a. Use half-length nails where required or indicated.
- 7. Metal Timber Framing Connectors
 - a. Nailing shall conform to manufacturer's instructions with a nail provided for each punched hole.

D. Sills:

- 1. Shall be in long lengths of sizes as indicated.
- 2. Fasten with a minimum of two (2) anchor bolts per piece and bolt within 9", but not nearer than 6", from the end of piece.
- 3. Malleable iron or steel plate washers shall be placed under anchor bolt nuts bearing on wood.
- 4. Set Sill level and true.
- E. Studs and Posts:
 - a. Shall be full length.
 - 2. Cut members to provide full bearing at ends.
- F. Plates:
 - 1. Shall be in long lengths and spliced as indicated.
- G. Joists and Beams:
 - 1. Shall be in long lengths and spliced over bearings unless otherwise indicated. Do not overcut
 - 2. Install with crown side up.

3. Beams or headers indicated to be built-up of two or more joists shall be constructed on the project site using full length members.

H. Blocking:

- 1. Blocking shall be same thickness and width of studs or joists unless otherwise indicated.
- 2. Install blocking at all wall, floor, or roof penetrations.
 - a. Blocking shall provide surface for fastening applied interior or exterior flashings or flanges.
- 3. Install blocking at all plywood joints.
 - a. Install blocking at plywood edges including crickets and parapet wall bracing.
- 4. Shall be provided for all fixtures, equipment, casework, toilet partitions, toilet accessories, handrails, visual display boards, identifying devices, finish hardware, flashing, wall and ceiling finishes, and other items as indicated. See also Specification Section OWNER FURNISHED ITEMS for listing of N.I.C. items that will require blocking coordination.
 - a. Coordinate placement of blocking and supports with manufacturer or supplier of items.
- 5. Fireblocking shall be provided to cut off all horizontal and vertical concealed draft openings in accordance with CBC Section 718.2.
 - a. Horizontal Fireblocking in walls shall be typically placed at 4'-0" above finished floor, at 8'-0" above finished floor, at mezzanine floor plane unless otherwise indicated, and at ceiling line plane.
- 6. Bridging shall be installed in all joist members deeper than 8 inches unless otherwise indicated.
 - a. Bridging shall extend the full depth of the joists.
 - b. Drill bridging within attics to provide ventilation as indicated.

I. Plywood Sheathing Panels:

- 1. For panels with different veneer face grades, the exposed face shall always be the higher grade.
- 2. Space panels 1/8 inch at all edge and end joints, and in accordance with APA.
- 3. Panels shall be applied with the long dimension (or strength axis) across the framing.
- 4. Fasten from the field of the panel first and then to the ends and edges to reduce stressing of the panel surfaces.
- 5. Center all joints over bearing supports.
- 6. Wall panels shall continue uninterrupted by ceilings or soffits from floor to floor or roof unless otherwise indicated.

J. Sheathing:

1. Shall be in accordance with the following:

a. Wall Sheathing: CBC Section 2304.6 and Table 2304.6 and Table 2304.6.1.

b. Floor and Roof Sheathing:
c. Structural Floor Sheathing:
d. Structural Roof Sheathing:
e. Lumber Decking:
CBC Section 2304.8.1.
CBC Section 2304.8.2.
CBC Section 2304.9.

K. Nailers and Grounds:

- 1. Shall be installed as indicated and where required for attaching other work.
- 2. Form to shapes indicated.
- 3. Coordinate locations with other work involved.
- 4. Provide nailers at all flashing and edge terminations when required by roofing manufacturer for metal and concrete roof decks. When the roof system is required to be Class A use fire-retardant treated wood.

5. Provide permanent Grounds of dressed, pressure-preservative-treated, Key-beveled wood and of thickness required to bring face of ground to exact finish thickness of finish material. Remove temporary grounds when no longer required.

L. Furring and Stripping

1. Shall be installed as indicated and where required to provide fastening material or space for the passage of pipes, conduits, etc. not accommodated including ceiling stripping.

M. Sealant:

- 1. When indicated, Primer shall be in accordance with sealant manufacturer recommendations.
- 2. When indicated, Joint Sealer shall be in accordance with Specification Section SEALANTS.

3.4 CONSTRUCTION

A. Draftstopping:

1. Shall be provided in floor, attic, and ceiling areas in accordance with CBC Section 718.3 and 718.4.

B. Pipes:

- 1. Frame to avoid cutting or drilling for passage of pipes, ducts, and conduit.
- 2. Follow criteria as indicated for cutting or drilling. Unusual edge distances and awkward spacing and sizes shall be brought to the Architects attention for remedy.

C. Chimneys and Flues:

1. Keep all framing 2 inches away from chimney or flues in accordance with CBC Section 2304.5.

D. Cant Strips and Crickets:

- 1. Shape to sizes indicated.
- 2. Rigidly fasten to construction.
- 3. Block all joints of plywood panel construction.
- 4. Form neat and mitered corners.

E. Temporary Enclosures:

1. Provide and maintain all barricades and enclosures required to protect the work in progress.

F. Shoring or Bracing:

1. Shore or brace for temporary support of all work as required during the construction period except any shoring and bracing specified and included under other sections of this Project Manual.

G. Wood Curbs for Equipment:

- 1. Construct all wood curbs for roof mounted equipment.
- 2. Provide all miscellaneous blocking, bracing, supports, and other wood items to complete the work.

3.5 FIELD QUALITY CONTROL

A. Site Tests:

1. As required by Regulatory Requirements.

09/07/2022

- 2. Project Inspector shall verify by means of a handheld moisture content meter that all wood and plywood supplied at the time of incorporation into structure(s) has met applicable moisture content requirements.
- 3. Project Inspector shall test all stud cavity walls to ensure that studs are a maximum of 19 percent moisture content prior to any other construction that encloses the wall cavity.

B. Inspection:

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

3.6 CLEANING

A. Removal of Debris:

1. Remove all Wood, including form lumber, chips, shavings and sawdust in or on the ground from the areas inside buildings. Do not bury debris in fill.

END OF SECTION

SECTION 064123 - MODULAR CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Modular Casework materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - a. Plastic laminate-faced casework.
 - b. Adjustable shelf supports: Metal Shelf Standards
 - c. Plastic Laminate countertops.
 - d. Solid-Surface countertops.
 - e. Plastic fabrications.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 15 14 DRILLED ANCHORS
 - 4. 03 30 00 CAST-IN-PLACE CONCRETE
 - 5. 05 12 00 STEEL AND FABRICATIONS (Steel supports for modular casework)
 - 6. 06 10 00 ROUGH CARPENTRY
 - 7. 07 60 00 SHEET METAL
 - 8. 08 70 00 HARDWARE
 - 9. 09 29 00 GYPSUM BOARD
 - 10. 09 65 10 RESILIENT BASE AND ACCESSORIES
 - 11. 09 72 00 WALL COVERINGS
 - 12. 09 91 00 PAINTING
 - 13. 10 05 00 MISCELLANEOUS SPECIALTIES
 - 14. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

- 1. In accordance with the following standards:
 - a. BHMA BHMA stands for Builders Hardware Manufacturers Associates, Inc.
 - b. NAAWS "North American Architectural Woodwork Standards," Latest Edition, including latest amendments, by the Architectural Woodwork Institute, Architectural Woodwork Manufacturers Association of Canada, and the Woodwork Institute.
 - c. NEMA National Electrical Manufacturers' Associates, Publication Number LD3, latest-edition
 - d. NIST National Institute of Standards and Technology
 - e. NWMA "Industrial Standard" National Woodwork Manufacturer's Association.
 - f. PS Product Standard of the U. S. Department of Commerce
 - g. WI Woodwork Institute

1.3 DEFINITIONS

A. Refer to NAAWS.

B. Exposed Portions:

- 1. Face members and edges of cabinets (cabinet fronts), such as face plates, drawer fronts, door fronts, front edge of shelves.
- 2. Interior faces of cabinet doors.
- 3. Underside of bottoms of upper cabinets, 48" above finished floor.
- 4. Cabinet tops:
 - a. Under 72" above finish floor.
 - b. Visible from upper building level.
- 5. Interior surfaces (including top, bottom, and front of shelves) of open cabinets or cabinets with glass doors.
- 6. All surfaces of exposed shelves.
- 7. All surfaces exposed to view.

C. Semi-Exposed Portions:

1. Cabinet divisions, shelves, insides of drawers, and any other cabinet members which cannot be seen when door or drawers are closed.

D. Concealed Portions:

1. Cabinet framing that cannot be seen, such as web frame members, sleepers, dust panels, toe strips covered with resilient base.

E. Shelving:

- 1. Top and bottom surfaces. Face surfaces are the front and rear edges.
 - a. Ends are the left/right edges as you face the cabinet.
- 2. The bottom surface material of all Upper Cabinets attached to walls shall be considered a shelf and manufactured as a shelf.

F. Quality Assurance Options:

- 1. Certified Compliance Program (CCP):
 - a. The CCP is an established discipline of quality control, for use in conjunction with the NAAWS, which provides a non-biased means of confirming conformance to a project's drawings and specifications.
 - b. Contractor to provide field inspection by WI Director, additional to CCP requirements.
 - c. The Woodwork Manufacturer shall have no less than 5 years of production experience, similar to this project, whose qualifications indicate the ability to comply with the requirements of this Section.
 - d. The Woodwork Manufacturer must have at least one project in the past 5 years where the value of the woodwork was within 20 percent of the cost of woodwork for this Project.
- 2. Monitored Compliance Program (MCP):
 - a. The MCP is an established discipline of quality control, for use in conjunction with the NAAWS, which provides a non-biased means of confirming conformance to a project's drawings and specifications,
 - b. Includes ongoing review/inspections of the project from its start to certification at completion.

- c. The Woodwork Manufacturer shall have no less than 5 years of production experience, similar to this project, whose qualifications indicate the ability to comply with the requirements of this Section.
- d. The Woodwork Manufacturer must have at least one project in the past 5 years where the value of the woodwork was within 20 percent of the cost of woodwork for this Project.

1.4 SYSTEM DESCRIPTION

- A. Performance Requirements: It is the intention of this specification section and the drawings to form a guide for a complete and operable system. Any items not specifically noted but necessary for a complete and operable system shall be provided under this section.
 - 1. All shelving must be manufactured according to NAAWS for Schools, Hospitals and Library or Book Shelving. 50 lbs./SF.

1.5 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - a. Submit manufacturer's full color range (including any standard and premium colors) for selection by the Architect.
 - b. Submit 2 copies of Manufacturer's current specifications for Modular Casework including all types of cabinets and accessories included in this section to the Architect for approval prior to fabrication.
 - 2. Shop Drawings.
 - Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loadings, required clearances, method of field assembly, seam locations, components, and location and size of each field connection.
 - b. Shop Drawing format in accordance with NAAWS Section 1, Submittals and WI's Certified Compliance Program.
 - 1) The shop drawings for the modular casework shall comply with and bear the WI CERTIFIED COMPLIANCE LABEL.
 - 2) Each elevation of casework, each laminated plastic top, and each solid surface top shall bear a WI CERTIFIED COMPLIANCE LABEL.
 - 3) Indicate spacing of all hardware accessories for Architect's review of layout.
 - 4) On casework and countertop elevations show the location of backing required for attachment within walls.
 - 5) Before delivery to the jobsite the woodwork supplier shall provide a WI CERTIFIED COMPLIANCE CERTIFICATE indicating the millwork products being supplied and Certifying that these products fully meet the requirements of the Grade or Grades specified.
 - 6) At completion of installation the woodwork installer shall provide a WI 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.
 - 7) All fees charged by the Woodwork Institute for their Certified Compliance Program are the responsibility of the millwork manufacturer and/or installer and shall be included in their bid.
 - 3. Samples.
 - a. Provide nominal 2" x 3" sample laminate color.

- 1) Submit color samples of specified Laminate and Acrylic Panel. Refer to Interior Color Schedule for Color/Pattern.
 - a) See drawings for high pressure decorative laminate color selection.
- 2) Submit color samples of high density overlay thermal-fused melamine for color selection by the Architect.
 - a) Samples shall be equivalent to SELPLY products, from their full color range selection chain of colors.
- 3) Provide finish color selection samples of Pilaster Standard. Specified colors subject to change.
- 4. Quality Assurance/Control Submittals:
 - a. Certificates:
 - 1) Submit three (3) copies of the following:
 - a) Before delivery to the jobsite, the modular cabinetwork supplier shall issue a WI CERTIFIED COMPLIANCE CERTIFICATE indicating the modular cabinetwork products and/or fabrication of products to be furnished for this project shall meet fully all the requirements of the grade or grades specified.
 - b) Upon completion of inspection of installation by WI Inspector, a WI CERTIFIED COMPLIANCE CERTIFICATE shall be furnished for the installation.
 - 2) Submit three (3) copies of a letter on Contractor's Letterhead certifying work provided, meets or exceeds, the requirements of this Section.
 - b. Labels:
 - 1) Each plastic laminate countertop supplied shall bear the WI CERTIFIED COMPLIANCE LABEL.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Material Qualifications:
 - a. Grades as indicated on the drawings in accordance with the specifications, rules and details or casework of the NAAWS Sections 5 "Finishing," 10 "Casework," and 11 "Countertops," unless the drawings and these specification modify said standards.
 - 1) See Appendix "A" for "Cabinet Design Series" (CDS) Number System used on Modular Casework Schedule.
 - b. Laminated Plastic Countertops, Splashes, and Wall Paneling in accordance with NAAWS Section 11 "Countertops."
 - 2. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - 3. Manufacturer/Supplier Qualifications:
 - a. Firm(s) experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
 - b. All modular Cabinet Work must be done by a Single Source WI licensed manufacturer and be able to provide a WI Certified Compliance Certificate.
 - c. Participation in Woodwork Institute Quality Assurance Program:
 - 1) If supplier is WI Member Licensee in good standing:
 - a) Comply with WI CERTIFIED COMPLIANCE PROGRAM (CCP).
 - b) Provide WI Director to inspect installation on-site.
 - 2) If supplier is not WI Member Licensee in good standing:

a) Comply with WI MONITORED COMPLIANCE PROGRAM (MCP).

B. Regulatory Requirements:

- 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. CBC All hardware for casework shall meet CBC Section 11B-309.4 and 11B-811.4.

C. Meetings:

- 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with all other related work
 - b. identify potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 - c. Review the locations of backing required for casework installation as shown on the casework shop drawings and the Contract Documents.
 - d. Review the method of attachment of the backing to the wall system as shown on the Contract Documents.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. WI Inspector, Project Inspector, and the Architect shall inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Packing, Shipping, Handling, and Unloading:
 - 1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
- B. Acceptance at Site:
 - 1. Hardware products (not already applied) must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
 - 2. Casework products must be free from scratches, gouges, or any other marring or discoloration.
 - 3. Damaged products will not be accepted.

C. Storage and Protection:

- 1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units, in compliance with PROJECT CONDITIONS below.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Humidity and Temperature: Maintain humidity and temperature in the space to receive products between 45 percent to 65 percent at a temperature of 60 degrees to 90 degrees F. Equilibrium Moisture Content of the wood product conditions shall be maintained between 8 percent and 12 percent. Maintain these requirements for four (4) days minimum prior, during, and following installation in accordance with manufacturer's written recommendations. Inform the Owner of humidity requirements for products installed and maintain until Substantial Completion and the turn-over of the building or facility to the Owner.

1.9 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES
 - a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified product manufacturers:
 - a. High Pressure Decorative Laminate: WILSONART.
 - 1) Cabinet Liner Series Type CLS.
 - b. Low Pressure Thermal-fused:
 - AMERICAN LAMINATE, PANELAM, or ROSEBURG FOREST PRODUCTS.
 - c. Acrylic Panel: 3-FORM.
 - d. Cabinetry Hardware: See Cabinet Hardware Schedule.
 - e. Countertop Support Brackets RAKKS.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 CABINET MATERIALS

A. Exposed Materials:

- 1. General:
 - a. In accordance with NAAWS Section 4 Sheet Products.
 - b. Minimize seams.
- 2. Laminate Systems:
 - a. Decorative Laminate:
 - 1) Horizontal Surfaces: Post-formed Grade HGP (0.042").
 - 2) Vertical Surfaces: Grade VGP (0.027").
 - a) Pattern direction: Vertical, unless otherwise noted.
 - b. Edgebanding:
 - Rigid PVC extrusions, through color with satin finish, 3 mm thick at doors and drawer fronts, 0.5 mm thick elsewhere. Color to match adjacent material.
- 3. Acrylic Panel:
 - a. General:
 - 1) Rate of Burning (ASTM D 635). Material must attain CC1 Rating for a nominal thickness of 1.5 mm (0.060 in.) and greater.
 - 2) Self-Ignition Temperature (ASTM D 1929). Material must have a Self-ignition temperature greater than 650 deg F.
 - 3) Density of Smoke (ASTM D 2843). Material must have a smoke density less than 75 percent.
 - 4) Flame spread and Smoke developed testing (ASTM E 84). Material must be able to meet a level of Class A (Flame spread less than 25 and smoke less than 450) at thickness of 1 inch.
 - 5) Room Corner Burn Test (NFPA 286). Material must meet Class A criteria at 1/4" thickness as described by the latest International Building Code.
 - 6) Extent of Burning (UL 94). Must submit UL card.
 - 7) Impact strength. Minimum impact strength test as measured by ASTM D 3763 of 20 ft. lbs. (for durability, shipping, installation, and use).
 - 8) Safety Glazing. Material must attain a Class A impact rating in accordance with ANSI Z97.1-2004 at 1/8" thickness.
 - 9) UPITT Test for Combustion Product Toxicity: Product must be recorded as "not more toxic than wood."
 - b. Type 1:
 - 1) Product: Height Tabula
 - 2) Color: Tabula
 - 3) Gage: 1/4"
 - 4) Surface Finish:
 - a) Front: Sandstone, Back: Sandstone.
 - 5) UV Protection: Not Required.
 - 6) Edge Sealing: Required.
 - 7) Attachment Method: Two Piece Standoff Panel Hanging Brackets.
 - 8) Installation: Panel to be installed Horizontally. Refer to Interior Elevations for layout and size.

B. Semi-Exposed Materials:

- 1. Cabinet Liner:
 - a. Complying with requirements of NEMA LD-3, Grade CLS.
- 2. Edgebanding:

- a. Rigid PVC extrusions, through color with satin finish.
 - 1) Typical: 0.5 mm thick.
 - 2) Front edge of shelves and all edges of drawers: 3 mm.

C. Concealed Materials:

- 1. Medium Density Fiberboard (MDF): ANSI A208.2.
 - a. Grade 130.
 - b. Grade 155.
- 2. Particleboard: ANSI A208.1, Grade M-2.
 - a. 44-50 lb Industrial Grade core.
 - b. Thickness Swell max: 5.5 percent.
- 3. Veneer Core Hardwood Plywood (VCHP):
 - a. No internal voids.
 - b. MDF cross bands to limit telegraphing of core grain is acceptable.

D. Fasteners:

- 1. Per NAAWS.
- 2. Corrosion resistant fasteners throughout the assembly of modular casework.
- 3. Confirmat screws.

2.3 FABRICATION

A. General:

- 1. In accordance with NAAWS Section 10 Casework, Custom Grade, as amended by the Contract Documents.
- 2. Interface Style, Frameless: Flush Overlay.
- 3. Seismic Force Requirements The types of construction approved by WI that meet CBC Title 24 seismic force requirements are: Lock Joint, Dowled, Dowled / Screwed Construction, Rabbeted Construction, Confirmat Screws, Fully Plowed-in Back, and Backs Screwed on in rabbeted ends, tops, and bottoms. The exact method for seismic force construction is available from WI.
- 4. Construct openings and backing as required for work done under Division 22 PLUMBING (sinks, plumbing, etc.) and Division 26 ELECTRICAL (outlets, switches, wiring, etc).
 - a. Exposed Edges: All exposed edges shall be sealed; including sink cut-outs & bottom edges of front edges.
- 5. Cabinets ganged together or attached to the wall shall be attached with countersunk screws to prevent binding of shelves when provided later.
- 6. Any vertical or horizontal plane surface less than four (4) foot wide and twelve (12) foot long shall be faced with one continuous sheet with the intent to minimize the number of seams throughout the work, in compliance with NAAWS Section 8 "Wall Surfacing."

B. Cabinets:

1. Cabinet box:

Bottoms and Ends of Cabinets: 3/4-inch particleboard.

b. Tops of Wall Cabinets and Tall Cabinets: 3/4-inch particleboard.

Particleboard.

c. Backs of Cabinets:

Concealed Backs: 1/4" minimum.

2) Exposed Backs: 1/2" minimum.

2. Filler Strips:

1)

a. Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets.

- 3. Shelving System:
 - a. Shelf Support System:
 - 1) Bored Hole Shelf Rest Systems:
 - a) 5mm diameter holes drilled approximately 8 mm deep, 32 mm o.c.
 - b) The front and rear row of holes shall be 37 mm from the front and rear edge of the cabinet.
 - c) Provide full cabinet height holes at 32 mm o.c. in each row to allow maximum flexibility of the user to arrange shelves.
 - 2) Provide four clips for each shelf.
 - b. Shelves: Veneer Core Hardwood Plywood.
 - 1) Span less than 25-inches: 3/4-inch.
 - 2) Span greater than 25-inches: 1-inch.
 - 3) Library shelves of any span: 1-inch thick.
- 4. Doors:
 - a. Doors: 11/16 inch core, 3/4 inch thick finished.
 - 1) Core material: MDF grade 130.
 - b. Large doors: 1 inch core, 1-1/16 inches thick finished.
 - 1) Large doors are more than 48 inches high and more than 24 inches wide.
 - 2) Core material: MDF grade 155.
 - c. Stiles and Rails of Glazed Doors: 3/4 inch thick.
 - 1) Core material: Particleboard.
 - d. Hinges:
 - 1) Let in 1/8 inch reveals for institutional hinges.
 - 2) Up to 48" high Doors: 3 hinges unless otherwise indicated on the drawings.
 - 3) 48" to 80" high Doors: 4 hinges unless otherwise indicated on the drawings.
 - 4) Door higher than 80": 5 hinges unless otherwise indicated on the drawings.
- 5. Drawers:
 - a. Drawer Fronts: 3/4-inch Particleboard.
 - b. Drawer Sides and Backs: 1/2-inch Veneer-Core Hardwood Plywood.
 - 1) Joined using Confirmat Screws in lieu of dowels.
 - c. Drawer Bottoms: 1/2-inch Veneer-Core Hardwood Plywood glued and dadoed into front, back, and sides of drawers.
 - d. File Drawers / Lateral File Drawers:
 - 1) Sides: 3/4-inch Veneer-Core Hardwood Plywood.
 - 2) Bottoms: 5/8 inch Veneer-Core Hardwood Plywood.
 - 3) Sides and bottoms shall be secured using 2-inch Confirmat screws.
 - e. Security Panels: 1/2-inch Veneer-Core Hardwood Plywood.
 - 1) Provide Security Panels above and below all locking drawers.
- 6. All drawers and doors shall be locked, keyed alike in each room and with building masters and grand master.
 - a. Each room shall be keyed alike:
 - 1) Provide 4 keys per lock.
 - 2) Provide 6 master keys.
- C. Countertops:
 - 1. General: In accordance with NAAWS Section 11 -- Countertops, as amended by the Contract Documents.
 - 2. Laminate Countertops:
 - a. Standard: In accordance NEMA standard LD-3.
 - b. Strength: 3/16 inch maximum deflection with 150 pound load at midspan.
 - c. Surface Material: Plastic Laminate.
 - d. Backing Material: Cabinet Liner.

e. Core: 3/4-inch Particleboard.

f. Front Edge: Self-edge build-up with drip groove edge.

g. Back Splash: 6 inch integral cove splash, unless otherwise indicated

on the drawings.

h. End Splash: 6 inch butt end splash, unless otherwise indicated on the

drawings.

i. Top of Splash: Square Edge.

j. Exposed Edges: All exposed edges shall be sealed; including sink

cut-outs & bottom edges of front edges.

D. Fabrications:

1. Plastic:

a. Pre-fabricated.

b. Field Fabricated.

E. Hardware:

1. See schedule at the end of this section for typical cabinet hardware.

- 2. Hardware shall be furnished and installed as required to provide a complete casework installation for overlay construction, unless noted otherwise.
- 3. Provide metal strike at locks.
- 4. Finish: BHMA 626 (26D), unless otherwise noted.

F. Countertop Supports

1. Steel Support Angle and Base Plate:

a. Single-piece construction: All welded ground smooth, flush and level.

b. Finish: Galvanized.

c. Angle material to be A36 (Fy=36ksi).

d. Plate material to be A36 (Fy=36ksi).

- e. All welding to conform to NAAWS and shall be done by certified welders.
- f. All work shall conform to the latest edition of the American Institute of Steel Construction.
- 2. RAKKS (EH Series Counter Support Brackets):
 - a. EH-1818 for counter depths up to 25"; suitable for surface mounted conditions.
 - b. EH-1824 for counter depths up to 30"; suitable for surface mounted conditions.
 - c. EH-1818FM for counter depths up to 25"; suitable for flush mounted conditions.
 - d. EH-1824FM for counter depths up to 30"; suitable for flush mounted conditions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

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

3.2 PREPARATION

A. Coordination:

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

B. Protection:

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

C. Surface preparation:

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

3.3 INSTALLATION

A. General:

- 1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
 - a. Provide experienced, factory trained craftspeople under manufacturers direct supervision.
- 2. In accordance with approved submittals.
- 3. In accordance with Regulatory Requirements.
- 4. The entire installation shall present a first class, workmanlike appearance, without open joints, tool marks or other blemishes, and subject to the Architect's approval.
- 5. Edges of cutouts, subject to excessive moisture, shall be sealed with a color-toned (for verification), water-resistant sealer before trim or sink rims are installed.

B. Layout:

- 1. Set plumb, level, and to true lines as shown on the drawings.
- 2. Filler panels and scribe strips or moldings, as required, shall be properly scribed to adjacent work and securely attached to cabinets as indicated on the drawings.

C. Anchorage:

- 1. The backs of the cabinets shall be secured to the wall backing.
- 2. Refer to the Drawings for the backing and anchorage details.
- 3. As a minimum, each cabinet shall be secured to the backing with a total of four #14 screws.

D. Cabinet Bases:

- 1. Toe Kick: Cabinet base shall be set back from the face of the cabinet 3-inches, or as indicated
- 2. Cabinet sides: Cabinet shall be set 3/8-inch back from the face of the cabinet.

3.4 FIELD QUALITY CONTROL

A. Inspection:

1. Schedule WI inspection with a minimum of 7 days notice of planned installation.

- 2. Schedule inspections and notify the Architect, Owner's Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
- 3. No work shall be without the inspections required by Regulatory Requirements.

3.5 ADJUSTING

A. Test and adjust carpentry hardware. Replace damaged or malfunctioning controls and equipment.

3.6 CLEANING

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

3.7 PROTECTION

- A. Protection from traffic:
 - 1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.8 SCHEDULES

- A. Standard Cabinetry Hardware specified, or approved equivalent:
 - 1. Hinges: Institutional Hinges for Overlay doors, 2-3/4" five knuckle with hospital tips and 2-5/8" extended side panel wing:
 - a. ROCKFORD PROCESS:
 - 1) #374 for 3/4" side panel x 3/4" thicknesses.
 - 2) #376 for 3/4" side panel x 13/16" thicknesses.
 - 2. Pulls (Steel Wire "U" Shaped 4" centers, 1-1/4" Projection from face of drawer or door):
 - a. JAMISON: SWP4-26D.
 - 3. Locks (Hinged Doors and Drawers for Overlay Construction):
 - a. COMP X NATIONAL: #C8053.
 - b. Approved equivalent manufacturer:
 - 1) OLYMPUS LOCK, INC. #DCN as required.
 - c. Provide compatible strike.
 - d. OLYMPUS LOCK, INC. #DCN as required.
 - e. Approved equivalent manufacturer:
 - 1) COMP X NATIONAL: #C8053.
 - f. Provide compatible strike.
 - 4. Locks (Sliding Doors):
 - a. COMP X NATIONAL: #C8142 (3/4").
 - b. Approved equivalent manufacturer:
 - 1) KNAPE AND VOGT.: #KV984.
 - c. Provide compatible strike.
 - 5. Locks (Sliding Glass Doors):
 - a. COMP X NATIONAL: #C8140 (1/4").

- MODULAR CASEWORK b. Approved equivalent manufacturer: KNAPE AND VOGT: #KV965. 1) Provide compatible strike. Drawer Slides up to 24 inches Wide: Pencil Drawers: 65 lb capacity, full extension, lever disconnect: 1) ACCURIDE 2632. Approved equivalent manufacturer: 2) KNAPE AND VOGT: 4400. General Purpose Drawers: b. 1) 100 lb capacity, full extension, rail mount disconnect: ACCURIDE Approved equivalent manufacturer: 2) KNAPE AND VOGT: 8400. c. File Drawers: 150 lb capacity, full extension, rail mount disconnect: ACCURIDE 4032. Approved equivalent manufacturer: 2) KNAPE AND VOGT: 8500. Drawer Slides over 24 inches Wide: Pencil Drawers: 100 lb capacity, full extension, push latch disconnect: 1) **ACCURIDE** 3732. Approved equivalent manufacturer: 2) KNAPE AND VOGT: 8400. General Purpose Drawers: b. 150 lb capacity, full extension, rail mount disconnect: 1) **ACCURIDE** 3641. 2) Approved equivalent manufacturer: KNAPE AND VOGT: 8500. File Drawers: c. 200 lb capacity, full extension, rail mount disconnect: 1) **ACCURIDE** 3642. 2) Approved equivalent manufacturer: KNAPE AND VOGT: File Frames for File Drawers & Lateral File Drawers. COMPX TIMBERLINE File Frame System. Adjustable Shelf Supports (zinc die-cast nickel plated supports) for glass shelves: HETTICH: #1 010 564. Adjustable Shelf Pilaster Standard and Shelf Supports: Pilaster Standard shall be KNAPE & VOGT #255, 19-gage x 5/8" wide x 3/16" high. 1) #255-WH (Epoxy-Coated White) at interior cabinet surface locations. #255-BRN (Brown) at exposed cabinet surface locations. Shelf Supports shall be KNAPE & VOGT #239 ZC (Zinc Coated). Magnetic Catcher:
- 11.

6.

7.

8.

9.

10.

- AMEROCK: #CM9783-AL. a.
- Approved equivalent manufacturer: b.
 - KNAPE AND VOGT: 1) #918-AL.
- 12. Wardrobe Clothes Pole:
 - KNAPE AND VOGT, Pole, 1-1/16"O.D., I.D. 29/32" SS tubing: #KV660. a.
 - KNAPE AND VOGT Wall Supports per tube length: #KV734 and #KV735. b.

- 13. Exposed Fasteners: When exposed fasteners are used, provide zinc chromate coated oval head, self-tapping phillips screws with grommet finishing washers, same finish as screws.
- 14. Tote Trays: High impact polystyrene with cardholder, 4-1/4 x 12-3/4 x 18-3/4 inch size.
- 15. Hinged Glass Doors:
 - a. 7/32 inch crystal sheet installed in accordance with WI Section 15.
- 16. Sliding Glass Doors:
 - a. 7/32 inch crystal sheet installed in accordance with WI Section 15.
 - b. Top and bottom metal tracks:
 - 1) Doors up to 24"w x 42"h: KNAPE AND VOGT #1092.
 - 2) Doors larger than 24"w x 42"h: KNAPE AND VOGT #992.
- 17. Casters: All swivel, 2 non-braking and 2 braking, with non-marking 5 inch diameter rubber wheels, manufacturer's standard finish.
 - a. FAULTLESS: #BP421-5 and #BP421-5RB.
- 18. Joint Closure:
 - a. PEMKO: #313AN.
- 19. Coat Hooks (Cast aluminum wardrobe hook):
 - a. IVES: #E IVSP581A3.
- 20. Exposed Fasteners: When exposed fasteners are used, provide zinc chromate coated oval head, self-tapping phillips screws with grommet finishing washers, same finish as screws.
- 21. Cabinet Catch (only when indicated on the drawings)
 - a. STANLEY #CD34.
- 22. Label Plate:
 - a. HAFELE #168.02.761.
- 23. Grommets, Cable Managers and Cabinet Vents:
 - a. Provide grommets, cable managers and cabinet vents in various sizes, finishes and shapes, as indicated on the drawings and as otherwise required for a complete installation.
 - b. Provide type S/S-3 Grommet for all conditions not noted. Grommets & Air Vents by DOUG MOCKETT & COMPANY, INC., or approved equivalent.
 - c. A partial listing is provided below (for other listings, see the drawings):
 - 1) Wire Manager: #WN-2A.
 - 2) Hair Dryer Holder at Printer Counter: #HD-1.
- 24. Miscellaneous Hardware Items:
 - a. DEMCO, INC.:
 - Maple Newspaper Sticks: #EP148-7821.
 Keyboard Drawer: #P148-0061.
 - b. HAFELE:
 - 1) Bow Handles: #102.49.402. 2) Compact Disk Rails: #810.58.335. 3) Video Cassette Rails: #810.58.326.
 - 4) Metal Label Frames: E168.02.789 (nickel-plated).
 - 5) Miscellaneous: Dished Sleeves, screws, washers, nuts, threaded pins, screw-in sleeves, shelf supports with locking screws, connecting fittings, & capped bolts.
 - c. NOVA:
 - Mobil Pedestal: #85 series.
 Retrofit Kit: E50-0-1818.
 - d. REV-A-SHELF:
 - 1) Cutlery / Utility Trays: CT4.
 - e. CHARLES McMURRAY:
 - 1) 2" Plate Casters: #MC660-44-273.

- B. Hardware list at Modular Music Instrument Cabinets:
 - 1. Hinges:
 - a. ROCKFORD PROCESS.
 - 1) #374 for 3/4" side panel x 3/4" thicknesses.
 - 2) #376 for 5/8" side panel x 13/16" thicknesses.
 - Catches: HAFELE 246.03.709 magnetic catch.
 Pulls: HAFELE 105.25.603 metal pull.
 Lock Hardware: As detailed on the drawings.
 - 5. Identification: HAFELE 168.01.460 transparent label frame (70 mm x 23mm).

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 072100 - INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
- B. Provide all material, labor, equipment and services necessary to completely install all Insulation, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- C. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 05 12 00 STEEL AND FABRICATIONS
 - 4. 06 10 00 ROUGH CARPENTRY
 - 5. 07 51 13 BUILT-UP ROOFING
 - 6. 07 60 00 SHEET METAL
 - 7. 08 11 00 METAL DOORS AND FRAMES
 - 8. 09 24 00 CEMENT PLASTER
 - 9. 09 29 00 GYPSUM BOARD
 - 10. 09 50 00 ACOUSTICAL CEILINGS
 - 11. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

- A. Standards:
 - 1. In accordance with the following standards:
 - a. MIMA Mineral Insulation Manufacturers Association
 - b. NFPA National Fire Protection Association
 - c. TIMA Thermal Insulation Manufacturers Association

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - a. Product Data on materials and accessories.
 - 2. Quality Assurance/Control Submittals:
 - a. Manufacturer's Written Instructions:
 - 1) Submit three (3) copies of manufacturer's written instructions.
 - 3. Closeout Submittals in accordance with the following:
 - a. Warranty in accordance with Specification Section WARRANTIES.

1.4 QUALITY ASSURANCE

A. In accordance with California Quality Standards.

- B. The R values for the insulation materials shall be in accordance with "The Standard Mineral Wool Building Insulation" latest Edition of the MIMA.
- C. Regulatory Requirements:
 - 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. ASTM American Society for Testing and Materials

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Storage of Materials:
 - 1. All Materials shall be delivered and stored in original unopened packages with manufacturer's name and contents legibly indicated. Materials shall be stored in a dry place, and protected from damage.

1.6 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES
 - a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified blanket insulation product manufacturer:
 - a. OWENS CORNING
 - b. Acceptable alternative manufacturers:
 - 1) CERTAINTEED
 - 2) JOHNS MANVILLE CORPORATION
 - 2. Specified sound blanket insulation product manufacturer:
 - a. OWENS CORNING
 - b. Acceptable alternative manufacturers:
 - 1) CERTAINTEED
 - 2) JOHNS MANVILLE CORPORATION
 - 3. Specified draft stop insulation product manufacturer :

- a. THERMAFIBER "Thermafiber."
- 4. Specified rigid roof board insulation product manufacturer:
 - a. RMAX (a SIKA company) "Multi-Max FA-3."
 - b. Acceptable Alternative Manufacturers:
 - 1) ATLAS.
 - 2) JOHNS MANVILLE CORPORATION.
 - 3) TREMCO.
- 5. Specified welded stud stick pins and self-locking washers product manufacturer or approved equivalent:
 - a. SUNBELT STUD WELDING.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Thermal Blanket:

- 1. Construction in accordance with the following:
 - a. Type I: Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with a maximum flame-spread and smoke-developed indices of 25 and 50, respectively, per ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials"; passing ASTM E 136 "Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C," for combustion characteristics.
 - 1) Unless otherwise noted, blankets without vapor-retarder membrane coverings, used in Interior partitions not subject to moisture.
 - Type II: Kraft-faced, Glass-Fiber Blanket Insulation: ASTM C 665
 "Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame
 Construction and Manufactured Housing," Type II (non-reflective faced), ASTM E
 84 Class C (faced surface not rated for flame propagation); Category I (membrane is a vapor barrier).
 - 1) Unless otherwise noted, this type of insulation should only be used in conditions not "subject to view" (enclosed cavities) or in attics where a finished ceiling is provided and the attic is not used as a return air plenum.
 - c. Type III: Reinforced-Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665
 "Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame
 Construction and Manufactured Housing," Type III (reflective faced), ASTM E 84
 Class A (faced surface with a foil-scrim or foil-scrim-kraft facing)
 - 1) Unless otherwise noted, this product shall be used when the attic (although enclosed by a finished ceiling) is used as a return air plenum, or used in "exposed-to-view" exterior and interior walls and ceilings or attics subject to moisture and fire-rated conditions.
- 2. Thermal Resistance (R) values required (minimum) for blanket insulation, unless otherwise indicated on the drawings:
 - a. Roof Blanket Insulation: R-30.
 - b. Wall Blanket Insulation: R-19.
 - c. Floor Blanket Insulation: R-30.
 - d. Attic Spaces: All attic spaces shall have continuous insulation of the proper type and with a minimum thermal resistance "R" value of R-30 for insulation only. Where attic spaces have vertical elements above ceilings, these shall be insulated as part of the attic space to R-30 minimum.
- 3. Thickness: No more than will fit into the space available without compressing. Where insulation is confined between finishes, which would compress the material, high efficiency insulation shall be used to provide the required resistance value.

B. Sound Blanket:

 Sound Attenuation Batts, unfaced, as manufactured by OWENS CORNING ECOTOUCH SOUND ATTENUATION BATTS, 2-1/2" batts for wood or metal frame construction, complying with ASTM C 665 "Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing," Type I, and ASTM E 136 "Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C."

a. Flame Spread Index Maximumb. Smoke Developed Index Maximum50.

C. Rigid Board:

- 1. Roof Board:
 - a. In accordance with:
 - 1) ASTM C 1289 "Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board," Type 2, Class 1, isocyanurate with front and back glass fiber/organic mat paper-facers (balanced panel), conditioned "R" value of 8.6 per 1.5 inchs minimum, in accordance with ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials," and ASTM D 1621 "Test method for Compressive Properties of Rigid Cellular Plastics."
 - a) Flame Spread Index Maximum, core: 25 or less.b) Smoke Density Developed Index Maximum, core: 450 or less.
 - c) Compressive strength: 20 PSI.
 - d) 4' x 4' or 4' x 8' panels.

2.3 ACCESSORIES

- A. Staples:
 - 1. Hammer type.
- B. Wire:
 - 1. Sixteen (16) gage line wire.
- C. All other materials such as fasteners (i.e. insulation netting, line wires, stick-pins), and retainers not specifically described, but required to complete the work, shall be as recommended by approved manufacturer, and installed by the Contractor. Contractor shall choose the appropriate fastener or system for the cavity space or area to be insulated without letting the insulation sag.
 - 1. Poultry Netting: As distributed by INSULATION MATERIALS.
 - a. 2" hexagonal, 20 gage galvanized in rated assemblies.
 - 2. FSK Tape: As distributed by INSULATION MATERIALS.
 - a. VENTURE TAPE product #1525CW.
 - 3. Welded Stud Stick Pins: As distributed by SUNBELT STUD WELDING.
 - a. Provide low-carbon "mild" steel, with the following properties:
 - 1) Tensile Strength: 60,000 psi.
 - 2) Yield: 50,000 psi.
 - 3) Elongation: 20% (in 2 inches).
 - b. Size: 12 gage.
 - c. Length sufficient to hold insulation to underside of decking, and extended enough to allow self-locking washers to hold insulation in place without crushing the insulation.
 - d. Spacing: 24 inches o.c.

- 1) Pins shall be placed within 3 to 5 inches of all area edges.
- e. Self-Locking Washers:
 - 1) 2 inch diameter, galvanized, compatible with welded stud stick pin size and gage.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

- 1. All building(s) shall have a complete thermal envelope of thermal blanket or rigid board insulation.
 - a. Do not install insulation until the construction has progressed to the point that inclement weather will not damage or wet the insulation material.
 - b. Install in accordance with manufacturer's written recommendations.
 - c. Insulation shall fit snugly between framing members without voids. Fully insulate all areas between all framing members, cutting and fitting as required.
 - d. Attach insulation to inside face of framing members.
 - 1) Wood Framing: Friction fit to keep from falling down within wall cavity. Attach with Hammer Staples at 6 inches on center with minimum staple penetration of 3/8 inch when insulation has a membrane facing.
 - 2) Metal Framing: Friction fit to keep from falling down within the cavity and use line wire across metal studs. Omit wire and spot tape with FSK Tape when insulation has a membrane facing.
 - e. Vapor-Retarder Membrane: Shall be continuous and without unnecessary joints.
 - 1) At roof structure and exterior walls, after securing the insulation facing flanges, provide FSK Tape over all of the insulation facing butt joints and all overlapping facing flanges, so as to create a continuous vapor-retarder membrane at underside of the roof deck and inside of walls.
 - 2) Patch all tears, rips and holes in the vapor-retarder membrane.
 - f. Cut and fit insulation material around pipes, conduits and outlet boxes, as necessary to maintain the full integrity of the insulation.

B. At Roof Framing:

- 1. Install thermal roof blanket Insulation between all exterior roof framing members.
 - a. Wood Framing: Attach wire to framing with staples with minimum staple penetration of 5/8 inch.
 - b. Metal framing: Attach with line wires perpendicular to framing at 12 inches on center.
- C. At Wall Framing: Install thermal wall blanket insulation between all exterior wall framing members.
- D. At Floor Framing: Install thermal floor blanket insulation between all exterior floor framing members.

E. Sound Insulation:

- 1. Install sound attenuation batts between all interior wall framing members.
- 2. Install sound attenuation batts between all floor framing members.
- 3. Install sound deadening board over interior wall framing members.

F. Draft Stop Insulation:

- 1. Install Draft Stop Insulation where required.
- G. Rigid Board Insulation:
 - 1. Install per manufacturer's written recommendations.
 - 2. Wall Board: Tape all edges as part of the rigid board system.
- H. Acoustical Blanket:
 - 1. Install Acoustical Blanket where indicated and per manufacturer's written recommendations.
- I. Sound Attenuation Fire Blanket (SAFB):
 - 1. Interior Stud Cavity: Friction fit SAFB's securely between studs. Butt ends of blankets closely together and fill voids.
 - 2. Creased SAFB: Bow the blankets slightly to fit into stud cavity. Slit the blankets vertically 1" deep with a utility knife.

END OF SECTION

SECTION 075113 - BUILT-UP ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. General: Provide all material, labor, transportation, equipment and services necessary to completely install all cold process bituminous roofing materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - 2. Conventional Built-Up Roof System consisting of modified asphalt-based two-ply system with white coating.
 - Owner Furnished Items, in accordance with Specification Section OWNER FURNISHED ITEMS, OFCI. Contractor shall provide additional material as required to complete the project.

Roof Cement: "Flashing Bond"
 Primer: "GarlaPrime VOC"
 Interply Adhesive: "Weatherking Plus WC"

4) Interply Felt, Flashing Sheet, Wall Flashing, Stripping Ply: "Stressbase 80"

5) Flashing Adhesive: "Weatherking Flashing"

6) Reinforcement Webbing: "GarMesh 6 inch"

7) Cap Sheet: "Stressply Plus FR Mineral"

8) Reflective Coating: "Pyramic Coating"9) Caulking: "Tuff Stuff CaulKing"

- B. Related Requirements: The following Sections contain requirements that relate to this Section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 06 10 00 ROUGH CARPENTRY
 - 4. 07 21 00 INSULATION
 - 5. 07 60 00 SHEET METAL for metal roof flashings, counterflashings, and utility sheet metal items.
 - 6. 07 72 00 ROOF ACCESSORIES
 - 7. 07 92 00 SEALANTS
 - 8. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

- I. In accordance with the following standards:
 - a. FMG Factory Mutual for FMG 1A-90 wind uplift requirements.
 - b. NIST BSS #55, Building Series #55: Preliminary performance criteria of Bituminous Membrane Roofing, National Institute of Standards and Technology, Gaithersburg, MD.
 - c. NRCA National Roofing Contractor's Association (NRCA).
 - d. SMACNA Sheet Metal and Air Conditioning Contractors National Association, Vienna, VA.
 - e. UL Underwriter's Laboratory (UL) test certification labels or equivalent testing agency with same follow-up testing and certified label program must be displayed on related roof assembly materials.

f. UL 790 Underwriter's Laboratory, certified roof assembly to roof type identified on the drawings.

1.3 SYSTEM DESCRIPTION

A. General

- 1. Performance Requirements:
 - a. Fire Rating: UL Class A.
 - b. Wind Uplift: FMG IA-90.
- 2. Typical system components for all roofing types:
 - a. Flashings and Flashing Accessories.
 - b. Reflective Surfacing over Cap Sheet.
 - c. KEE membrane at parapets over 48" in height.
- B. Typical wood deck roof system section for this project:
 - 1. Plywood deck.
 - 2. Rosin Paper.
 - 3. Rigid Board (Isocyanurate Board).
 - 4. Cover Board (Fiberboard).
 - 5. Two (2) ply bituminous roofing system, cold process.
 - a. One (1) Interply Felt / Flashing Sheet / Stripping Ply.
 - b. One (1) Mineral Surfaced Cap Sheet.
- C. The extent of cold process bituminous roofing system work is indicated by provisions of this section, and is defined to include roofing, insulation immediately under the roofing systems, elastomeric flashings, stripping, walkpads, and roofing accessories integrally related to roofing installation with all compatible with manufacturer's warranty requirements.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Coordination Drawings:
 - a. Submit installer's coordination drawings indicating the work of this section coordinates with that of related sections for proper interface of the completed work.
 Installer shall coordinate and obtain approvals of other related sections prior to submitting to the Architect.
 - b. Submit one-way roof vent location plans to the Architect for approval that has been approved by the roofing manufacturer as to location in conjunction with all proposed roof penetrations.
 - 2. Product Data.
 - a. Submit manufacturer's product data including performance requirements of all materials.
 - b. Material Safety Data Sheets will not be reviewed, but if submitted will be turned over to the Owner in compliance with local rules and regulations.
 - 3. Shop Drawings.
 - a. The Roofing Contractor, in concert with the Material Manufacturer, is to submit detailed drawings of all flashing and roofing system details compatible with the manufacturer's requirements for the roofing system warranties, required herein for review and approval, prior to start of roof framing by the General Contractor.
 - 4. Quality Assurance/Control Submittals:
 - a. Certificates:

- 1) Submit three (3) copies of certification from a Corporate Officer of the Roofing Material Manufacturer stating that major roofing system components including insulation, flashing, coatings, cold process adhesives; roofing ply sheets; reinforcement fabrics, felts, walkpads, mastics, and sealants are compatible with all the other components of the roofing system and the warranties required herein, for single source liability.
- 2) Submit three (3) copies of certification from Roofing Material Manufacturer that cold process coatings and adhesives are not "Red Label".
- 3) Submit three (3) copies of certification from Underwriter's Laboratory (or approved equivalent prior to submittal) that the roofing systems meet or exceed listed performance requirements listed herein.
- 4) Submit three (3) copies of certification from an independent laboratory showing test results (utilizing the ASTM testing criteria listed herein) for all roofing materials and completed assemblies, indicating compliance with the performance requirements listed herein.
- b. Manufacturer's Written Instructions:
 - 1) Submit three (3) copies of certification from an independent laboratory showing test results (utilizing the ASTM testing criteria listed herein) for all roofing materials and completed assemblies, indicating compliance with the performance requirements listed herein.
- c. Manufacturer's Field Reports:
 - 1) Submit three (3) copies of manufacturer's field reports for each roofing system type indicated (i.e. those appropriate for metal decks or wood decks) indicating the final status of the installed roofing systems over various roof decking systems, and that they are in compliance with the manufacturers warranty requirements.
- 5. Closeout Submittals in accordance with Specification Sections in Division One:
 - a. Project Record Documents in accordance with Specification Section PROJECT RECORD DOCUMENTS.
 - b. Warranty in accordance with Specification Section WARRANTIES.
 - 1) Special warranties:
 - a) Five (5) Year Workmanship Warranty.
 - b) Twenty (20) Year Major Manufacturer's Roofing System Warranty.

1.5 QUALITY ASSURANCE

- A. General Requirements:
 - 1. The Roofing Contractor shall ensure that all products used in conjunction with the installation of the new roofing system(s) are totally free of asbestos. Products containing asbestos are prohibited on this project.
 - 2. Deliver all roof system materials in original manufacturer labeled packages. All roofing products delivered to the site and used on this project will bear Class A Fire Rating Labels
 - 3. All adhesives and cements shall be compliant with current applicable VOC Requirements State and Local on the project. Contractor shall use products with personal protection when applicable. The Roofing Contractor shall insure that all product users read container labels and MSDS information prior to use.
- B. Only those manufacturers who produce, label and warrant all major and/or primary components of the specified roofing system, can exhibit \$10,000,000.00 product liability, or a \$2,000,000.00 product liability policy with a \$5,000,000.00 umbrella per event insurance coverage and comply with all other requirements of this Specification.

C. The products listed herein establish the size, weight, pattern, color range and function selected by the Architect for this Project. The intent is not to limit competition, but to utilize only those products which have been employed previously on projects of a similar nature and found acceptable.

D. Qualifications:

- 1. Material Qualifications:
 - a. Roofing Material Manufacturer shall:
 - 1) Be nationally recognized in roofing and waterproofing industry for at least ten (10) years.
 - 2) Provide local Field Representative to make periodic site visits, report work quality and job progress.
 - 3) Provide list of at least three (3) projects available for inspection employing same system(s) within the last three years, within the same climate zone and 75 mile distance of project building(s).
 - 4) Be approved by Owner and the Architect.
 - Provide Owner and the Architect proof/copy of material product liability insurance for all materials in an amount not less than \$10,000,000.00, or a \$2,000,000.00 product liability policy with a \$5,000,000.00 umbrella per event.
 - 6) Provide Owner and the Architect certified independent laboratory test results for all roofing materials using ASTM test criteria as designated in Part 2 Product section of this Specification indicating compliance with the performance criteria contained herein.
 - 7) The presence and activity of the manufacturer's representative and/or Owner's representative shall in no way relieve the roofing contractor of his/her contractual liabilities/responsibilities.
 - 8) Provide to the Owner names of at least three (3) qualified roofing applicators/installers.

2. Installer Qualifications:

- a. The Roofing Contractor shall be experienced and certified in writing by the Roofing Material Manufacturer to install manufacturer's products and systems in accordance with manufacturer's warranty requirements.
- b. The Roofing Contractor and his/her installers shall:
 - 1) The Roofing Contractor shall be experienced and certified in writing by the Roofing Material Manufacturer to install manufacturer's products and systems in accordance with manufacturer's warranty requirements.
 - 2) Be acceptable to the Owner, Architect and Roofing Material Manufacturer.
 - 3) Provide list of at least three (3) projects available for inspection employing specified system(s) within the last three years, within the same climate zone and within 75 miles distance of project building(s).
 - 4) Be responsible for obtaining all data required from Roofing Material Manufacturer.
 - 5) Obtain and provide all required data from Roofing Material Manufacturer.
 - a) These specifications are based on minimum performance requirements of both the Roofing Contractor and Roofing Material Manufacturer.

E. Regulatory Requirements:

I. In accordance with Specification Section - Regulatory Requirements, and the following:

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

F. Meetings:

- 1. Pre-installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with all other related work.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
- 2. Progress Meetings: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule of necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 - 1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
 - 2. Handle materials to avoid bending, tearing, or other damage during transportation and installation.
 - 3. Material handling equipment shall be selected and operated so as not to damage existing construction or applied roofing.
 - a. Do not operate or situate material handling equipment in locations that will hinder smooth flow of vehicular or pedestrian traffic.

B. Acceptance at Site:

- 1. Coordinate delivery with Contractor.
- 2. Products delivered to the job-site must be in manufacturer's original, new, dry and unopened containers with labels indicating brand name, grade and ASTM number.
- 3. Deliver materials in sufficient quantity to allow continuity of work.
- 4. Damaged products will not be accepted.

C. Storage and protection:

- 1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.
 - b. Store roll goods on ends only and protect from moisture contamination of any kind.
 - c. Discard rolls and insulation which have flattened, creased, allowed to become damp/wet, or otherwise damaged.
 - d. Place and store materials on pallets.
 - e. Do not stack pallets.
- 2. Store materials marked "keep from freezing" in areas where temperatures will remain above 40 degrees Fahrenheit.
- 3. Neatly stack products on dunnage.

- 4. Remove breathable waterproof covering. Cover top and sides of all stored materials at interior and exterior storage areas with canvas tarpaulin or equivalent cover to allow the materials to "breathe".
 - a. Secure cover.
 - b. Do not use polyethylene to cover materials.
- 5. Rooftop Storage: Disperse material to avoid concentrated loading. Any damage to the structure resulting from non-conformance to this requirement will be the sole responsibility of the roofing contractor.
- 6. Materials necessary for two day's work may be stockpiled on roof under the provisions outlined in paragraph 5 above.
- 7. No materials may be stored in opening or in contact with ground or roof/deck surface.
- 8. The Roofing Contractor shall assume full responsibility for the protection and safekeeping of roofing materials and products stored on the job-site premises.

1.7 PROJECT CONDITIONS

A. Environmental requirements:

- 1. Do not work in rain, snow, or in presence of moisture, including dew or fog.
- 2. Do not work in temperatures at or below 40 deg. F.
- 3. Do not install materials marked "keep from freezing" in areas where temperatures will remain below 40 deg. F.
- 4. Remove any work exposed to freezing and replace with new.

B. Existing Conditions:

- 1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.
- 2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.
- 3. The Roofing Contractor shall have SOLE responsibility for accuracy of all measurements, estimates or material quantities and sizes, and site conditions that will affect work.

1.8 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

- 1. Roofing Contractor and Roofing Materials Manufacturer's Guarantee:
 - a. Upon project completion and Roofing Material Manufacturer's acceptance of the completed roofing system, the roofing contractor shall deliver to the Owner a Major Manufacturer's Roofing System Guarantee, covering labor and materials, and shall guarantee to repair or replace defective materials including labor and installation on a pro-rated basis.
 - 1) Warranty period Twenty (20) Years.
 - 2) The Roofing Material Manufacturer shall provide re-inspection of roofing system, including all integral components, at two (2) year and five (5) year anniversaries, and provide the Owner written summary of roof system analysis.

- a) Provide housekeeping and preventative maintenance at the 2nd and 5th year site visits.
- 3) Written guaranties or warranties will include all integral components of entire roofing assembly including: Insulation, roof membrane, flashings, termination details, metal components and surfacing materials.

C. Installers Warranty:

- 1. Roofing Contractor's Workmanship and Materials Warranty:
 - a. Upon project completion and acceptance, the subcontractor shall issue Owner a warranty against defective workmanship and materials.
 - b. The roofing contractor shall warranty to maintain the roof and flashing in a watertight condition for the period of years specified from the date of acceptance and shall be responsible for the repair of any failure that is the result of defects in materials and workmanship.
 - 1) Warranty Period Five (5) years.
 - c. The roofing contractor shall obtain from the Roofing Material Manufacturer and the General Contractor a co-endorsement of the Warranty.

1.9 MAINTENANCE

A. Maintenance Service:

1. Continuing Maintenance Agreement: Provide a continuing maintenance proposal from Installer to Owner with terms, conditions, and obligations as set forth in, and in the same form as, "Draft of Roof Maintenance Agreement" at end of this Section, starting on the date established for Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified product manufacturer, District Standard:
 - a. THE GARLAND COMPANY, INC.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Insulation Materials:

- Cover Board:
 - a. Fiberboard: Regular density, asphalt impregnated on two sides, in accordance with ASTM C 208 "Specification for Cellulosic Fiber Insulating Board".
- 2. Cricket Board:

with surface fiber/organic mat facers on both sides, conditioned "R" value of 5.70 per inch.

Blame Spread and Smoke Developed in accordance with A STM F84 "Test method

Isocyanurate Insulation Board: FS HH-1-1972/2(1), Type II, Class 1, isocyanurate

- b. Flame Spread and Smoke Developed in accordance with ASTM E84 "Test method for Surface Burning Characteristics of Building Materials":
 - 1) Flame Spread Index: 25 60
 - 2) Smoke Density Developed Index: 75 160 range.
- 3. Insulation Board Sizes:
 - a. Rigid Board: 4' x 8' x 1".
 - 1) Cricket Board: 2' x 4' dimension minimum, tapered thicknesses, slope as indicated.
 - b. Cover Board: 4' x 8' x 1/2 inch minimum thickness (or as required for a Class A roof system).
- 4. Cant Strip:

a.

- a. Fiberboard, in accordance with ASTM C 208 "Specification for Cellulosic Fiber Insulating Board". Length: Forty-eight (48) inches.
 - 1) Minimum thickness: Three (3) inches nominal, face 4 inches nominal.
- 5. Insulation adhesive:
 - a. ASTM D 312 "Specification for Asphalt Used in Roofing", Type IV asphalt.

B. Mechanical Fasteners:

1. Provide industry-standard, non-corrosive types of mechanical fasteners (i.e.: screws and plates, termination bars, drawbands) for cold process built-up roofing system work, tested by manufacturer for required pull-out strength where applicable and compatible with substrate type, roofing products used and warranties required. Size of fasteners and plates shall be as recommended by roofing manufacturer in accordance with manufacturer's warranty requirements, and sufficient to comply with FMG 1-90 wind uplift requirements.

C. Roofing Materials:

- 1. Roof Cement: Fibrated asphalt mastic meeting or exceeding ASTM D 4586 "Specification for Asphalt Roof Cement, Asbestos-Free".
- 2. Primer for all sheet metal and concrete surfaces:
 - a. Quick drying, asphaltic primer meeting or exceeding ASTM D 41 "Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing" and complying with CARB requirements.
- 3. Interply Adhesive Cold Adhesive
- 4. Interply Felt:
 - Nonperforated, SBS Modified, asphalt-coated, fiberglass reinforced sheet dusted with fine mineral surfacing on both sides that meets the requirements of ASTM D 5147 "Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material".
- 5. Flashing Sheet and Wall Flashing: Fiberglass Reinforced SBS Modified Membrane.
- 6. Wall Flashing at parapets over 48":
 - a. Fully adhered 60 mil reinforced KEE membrane that is fully approved, warranted, and in accordance with modified membrane manufacturer.
- 7. Flashing Adhesive: Asphalt Mastic.
- 8. Reinforcement Webbing: Vinyl-Coated Fiberglass Webbing.
- 9. Stripping Ply: Refer to Interply Felt.
- 10. Cap Sheet Granule Surfaced SBS(-SIS) Modified Membrane.
 - a. ASTM D 6163 "Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements", Grade G, Type I, glass-fiber-reinforced, SBS Modified Asphalt Sheet, Granular Surfaced.

- 11. Reflective Surfacing Coating. Acrylic Reflective Coating per CRRC for a "Cool Roof".
- 12. Caulking:
 - a. Single component, non-sag, epoxidized polyurethane sealant, per Federal Specification TT-S-00230C.
- 13. Walkpads:
 - a. As recommended by manufacturer in accordance with manufacturer's warranty requirements, Class A material, and sufficient to comply with FMG 1-90 wind uplift requirements.
 - b. Size as indicated on the drawings, in patterns and routes sufficient to protect adjacent roof areas from damage during anticipated maintenance of roof mounted equipment.

2.3 SOURCE QUALITY CONTROL

A. Cold Process Interply Adhesive - "Weatherking Plus WC":

1.	Property	Typical Value	Test Method
2.	Asbestos content	None	ASTM D 276-87
3.	Viscosity @ 25 deg. C.	800-1200 grams	ASTM D 2196-86
4.	Density @ 25 deg. C.	9 lb/gal.	ASTM D 1475-90
5.	Nonvolatile Matter	78%	ASTM D 4479-93
6.	Asphalt content, min	42%	ASTM D 4479-93
7.	Flash Point	> 100 deg. F	ASTM D 93-94
8.	Uniformly & consistency	Pass	ASTM D 4479-93

B. Base Ply/Stripping Plies: "StressBase 80":

1.	Property	Typical Value	Test Method
2.	Tensile Strength	100 lbf/in MD; 100 lbf/in XD	ASTM D 5147
3.	Thickness	0.080 inch	ASTM D 146-90
4.	Weight	80.0 lb/100 sf	ASTM D 228-90a

C. Cap Sheet - Fiberglass Reinforced Granule Surfaced SBS-SIS Modified Membrane: "StressPly Plus/ Plus FR":

1.	Property	Typical Value	Test Method
2.	Thickness	.155 in.	ASTM D 5147-95
3.	Tensile Strength	310 lbf/in MD; 310 lbf/i	n XMD ASTM D 5147-95

D. Flashing Sheet -- Polyester Reinforced Granule Surface SBS Modified Membrane - "Stressply Plus FR Mineral":

1.	Property	Typical Value	Test Method
2.	Thickness	.155 in.	ASTM D 5147-91
3.	Tensile Strength	310 lbf/in MD; 310 lbf/in X	MD ASTM D 5147-91
4.	Elongation	3.5% MD; 3.5% XMD	ASTM D 5147-91
5.	Tear Strength	500 lbf MD; 500 lbf XMD	ASTM D 5147-91ow
	Temp.		

- E. Reflective Surfacing: "Pyramic"
 - 1. White Elastomeric Coating.
 - 2. Reflectance: 84%, min 5-year.
 - 3. Energy Star compliant.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

- 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other specification sections of this Project Manual which affect the execution of work under this specification section. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
- 2. Prior to installation of roofing, the Roofing Contractor shall inspect the new deck conditions and verify that the new roof system may be installed in strict accordance with original design, the manufacturer's current recommendations, and all other pertinent codes and regulations.
- 3. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
- 4. Execution of work under this specification section shall constitute acceptance of existing conditions.
- 5. Check projections, curbs, and deck for inadequate anchorage, foreign material, moisture, or unevenness that would prevent quality and execution of the new roofing system.

B. General quality of work:

- 1. Substrate Free of foreign particles prior to laying roof membrane.
- 2. Phased application:
 - a. Not permitted.
 - b. All plies shall be completed each day.

3.2 PREPARATION

A. Coordination:

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

B. Protection:

- 1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
- 2. Roofing Contractor shall be responsible for protection of property during course of work.
 - a. Lawns, shrubbery, paved areas, and building shall be protected from damage.
 - b. Repair damage at no extra cost to Owner.
- 3. Provide at site prior to commencing removal of debris, a dumpster or dump truck to be located adjacent to building where directed by General Contractor.
- 4. Roofing, flashing, membrane repairs, and insulation shall be installed and sealed in a watertight manner on same day of installation or before arrival of inclement weather.
- 5. At start of each work day drains within daily work area shall be plugged.
 - a. Plugs to be removed at end of each work day.
- 6. Preparation work shall be limited to those areas that can be covered with installed roofing material on same day.
- 7. Arrange work sequence to avoid use of newly constructed roofing for storage, walking surface, and equipment movement.
- 8. At end of each working day, completed segment shall be sealed with water stops along edges to prevent water infiltration. Refer to INSTALLATION for specific instruction.

- 9. Provide clean plywood walkways and take other precautions required to prevent tracking of debris into new membrane area where debris pieces can be trapped within new roofing membrane.
 - a. Contractor shall instruct and police his/her workers to ensure that debris is not tracked into or allowed to be wind driven into the new membrane.
 - b. Discovery of entrapped debris or other foreign matter within new membrane is sufficient cause for rejection of the membrane.

3.3 INSTALLATION

A. General:

- 1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
- 2. In accordance with approved submittals.
- 3. In accordance with Regulatory Requirements.

B. Installation of Rosin Paper (Wood Deck):

1. Mechanically fasten sheathing paper to roof deck using mechanical fasteners specifically designed and sized for fastening to wood decks.

C. Insulation Installation:

- 1. Extend insulation over horizontal surfaces, including parapet braces, until the insulation boards meet the vertical parapet wall surfaces.
 - a. Flush all insulation board surfaces that meet adjacent surfaces to be free from any uneven or gapped joints, sharp edges or other irregularities.
- 2. Install base layer of insulation with joints staggered not less than 24 inches in adjacent rows.
 - a. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - b. Make joints between adjacent insulation boards not more than 1/4 inch in width.
 - c. At internal roof drains, slope insulation to create a square drain sump, with each side equal to the diameter of the drain bowl plus 24 inches.
 - 1) Trim insulation so that the flow of water is not restricted.
 - d. Fill gaps exceeding 1/4 inch with insulation.
 - e. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
 - f. Mechanically attach base layer of insulation using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to **wood** decks.
 - g. Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof
 - h. Install upper layers of insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.
 - 1) Staggered end joints within each layer not less than 24 inches in adjacent rows.
 - 2) Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
 - 3) Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - 4) Make joints between adjacent insulation boards not more than 1/4 inch in width
 - 5) At internal roof drains, slope insulation to create a square drain sump, with each side equal to the diameter of the drain bowl plus 24 inches.
 - a) Trim insulation so that the flow of water is not restricted.

- 6) Fill gaps exceeding 1/4 inch with insulation.
- 7) Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

D. Installation of Cover Boards:

- 1. Wood Deck:
 - a. Mechanically attach single layer Cover Board insulation to deck.
 - b. Fastener Density:
 - 1) Perimeter 16 fasteners per 4' x 8' insulation board.
 - 2) Field 12 fasteners per every 4' x 8' insulation board.
 - c. Install additional fasteners to ensure insulation is firm under foot.
 - d. Drive mechanical fasteners flush to top surface.
 - e. Filler insulation requires two (2) fasteners per piece minimum.

E. Flashing:

- 1. General Flashing Specifications:
 - a. All other flashings not specifically detailed herein will be applied in accordance with manufacturer's written recommendations and approved by the Architect.
 - b. All sheet metal that will come in contact with bituminous materials shall be primed with the specified asphaltic primer and allowed to dry before applying bitumen.
 - c. The bottom edge of all flashing shall be three-coursed.

F. Wall Flashing:

- 1. SBS Modified Wall Flashing Installation:
 - a. Roofing Contractor shall install base flashing at the base of all existing vertical wall and curb surfaces in the following manner:
 - 1) All flashing must be temporarily sealed at the end of each working day.
 - 2) Refer to manufacturers recommended installation procedures and the system performance requirement for proper installation of perimeter flashings.
 - 3) All Wall Flashings will receive a backer sheet utilizing the ply/base sheet.
 - 4) Wall Flashing shall extend from the top of the parapet and down the inside face of the wall. Embed the SBS Modified flashing sheet in a continuous application of flashing mastic per the manufacturer's current written recommendations.
 - 5) Secure the top edge of the base using a galvanized metal termination bar. Fasten the termination bar to concrete walls using concrete screws turned into pre-drilled holes at 8 inches on center. Fasten the termination bar to plywood walls using screws at 8 inches on center.
 - 6) The flashing sheet shall extend to the outside edge of all raised edge nailers.
- G. Roofing Contractor shall install roof drain flashings as follows:
 - 1. Drain rings shall be removed prior to built-up roofing application.
 - 2. A minimum 3 foot square lead flashing sheet shall be set into a solid coating of asphaltic mastic over the installed roofing plies. Install a one (1) ply stripping using specified base sheet. First ply shall be embedded in a asphaltic mastic and shall cover the lead completely and extend onto the field of the roof 6" in all directions. All plies, including the lead flashing and field plies must extend into the drain and under the clamping ring.
 - 3. The drain ring shall be set into asphaltic mastic and immediately tightened. A guard screen shall be installed over all drains.
 - 4. After complete installation of the roofing system, Roofing Contractor shall inspect and test all roof drains to assure that no clogging of the drainage system is present. The roof drain leader should be in such condition that full diameter of the drain leader is clear.
- H. Roofing Contractor shall tie onto all flanged metal components in the following manner:

- 1. Prime all metal that is to come into contact with asphaltic compounds with specified primer.
- 2. All flanges shall be set into asphaltic mastic over the finished roofing plies. Galvanized metal flanges will be fastened to the underlying wood nailers at three (3) inches on. center, staggered.
- 3. All flanges, including pipe flashing, edge flashing, flanged vents, flanged units, pitch pans, etc., will be flashed on the roof with two plies of stripping ply sheet. Install a one (1) ply stripping using specified base sheet. First ply shall be embedded in a asphaltic mastic and shall cover the lead completely and extend onto the field of the roof 6" in all directions.
- I. Contractor shall install all edge metal in the following manner:
 - 1. Set edge metal into layer of asphaltic mastic over finished field plies.
 - 2. Install metal cleats. Cleats shall be at least one gage heavier than the metal edge.
 - 3. Metal sections shall be a maximum of ten (10) feet in length. Leave a minimum of 1/2" space between metal sections. Install a minimum of 4" wide lap over and nail in place through 1/2" gap in metal sections. Nail metal edge 3" o.c. staggered.
- J. Install one ply of stripping ply sheet to metal flange and roof surface. Roofing system application:
 - 1. Install one (1) pliy of specified composite reinforced roofing felts over the cover board and the roof deck system, set into solid spray applications of cold-process asphalt in the following manner:
 - a. Starting at the low point of the roof, apply one 4 inch side strip, and then over starter strip, apply a full 36 inch wide specified roofing felt. Following plies are to be applied full width, overlapping the preceding felt by 4 inches.
 - b. Cut 12 to 18 foot lengths of specified felt, allow to relax thirty (30) minutes at 55 deg. F+ or sixty (60) minutes at 55 deg. F-. Flop shingle fashion into a full width application of cold-process asphalt applied at a nominal rate of 2.0 gallons per 100 square feet. The specified felt must be firmly and uniformly set into the asphalt with all edges well sealed.
 - c. Lightly broom and/or roll each ply of specified felt into place, full width, immediately after installation. Felts shall lay flat and be fully bonded in such a manner that in no area shall felt touch felt. Use only a squeegee or conduit type broom.
 - d. Apply uniform and continuous pressure to exposed edge and end laps to ensure complete adhesion.
 - e. Lap ply ends 6 inches. Stagger end laps 3 feet minimum.
 - f. Header laps in roof field shall be at least 2 feet.
 - g. Overlap previous day's work 18 inches.
 - h. Cut out and patch all fishmouths and side laps which are not completely sealed. Replace all sheets which are not fully and continuously bonded.
 - i. Roof surface will be rolled after each work day to smooth fishmouths.
- K. Contractor shall adhere to the following guidelines:
 - 1. Roofing materials shall not be installed during inclement weather. Roofing materials shall not be applied when moisture in any form, such as dew, can be seen or felt on the surface to which those materials are to be applied.
 - 2. Valleys and waterways shall receive an additional ply of fiberglass felt which shall be at least 36 inches wide. This ply shall be laid on top of the insulation prior to the application of the other plies and shall extend at least 18 inches up the inclines, out of the valleys.
 - 3. Interply applications of cold-process asphalt shall be continuous and applied at a nominal rate of 2.0 gallons per 100 square feet. Application methods shall insure that all plies are completely embedded in asphalt.

- All exposed deck and insulation must be covered with the completed roof membrane system, at the end of each day's work. All roof terminations and openings shall be water sealed.
- 5. Staging of the roof membrane application or temporary membrane is not acceptable. Membrane shall be installed in final form, with the exception of the cap sheet, on a daily basis.
 - a. If phased roofing occurs, following prior approval of the Architect, as a result of emergency conditions, install additional plies over phased areas so that a continuous three (3) ply system is installed.
- 6. Foot and wheeled traffic shall be kept off the newly installed membrane until asphalt has sufficiently cured to prevent displacement voids.
- 7. All membrane deficiencies such as voids, bridging, fishmouths, cuts, tears, etc., shall be repaired in an acceptable manner. Incorporate into such repairs as many plies as are affected by the deficiency.
- 8. Air void pockets, as determined by test samples, shall not exceed eight percent per interply mopping for individual sample and average of all samples shall be not less than five percent per interply adhesive. If corrective action is required, cut the roofing felts down to the void and cover with three plies of fiberglass felt set into cold-process asphalt applied at a nominal rate of 3 gallons per 100 square feet.

L. Walkpad Installation:

- 1. After roof coating has been applied and cured, install walkpad panels in a path 3 feet wide around all HVAC mechanical units requiring regular maintenance (coordinate with mechanical contractor for items requiring maintenance). Space between pads no greater than 6 inches, and no less than 4 inches.
- 2. Adhere to roofing in a spot application of asphalt mastic.

3.4 APPLICATION

- A. Cap Sheet: Install lapped granulated cap sheet starting at low point of roofing system. Offset laps from laps of preceding ply sheets and align cap sheet without stretching. Lap in direction to shed water. Extend cap sheet over and terminate beyond cants.
 - 1. Embed cap sheet in a solid application of cold fluid-applied adhesive applied at rate required by roofing system manufacturer.
- B. Apply White Surfacing over completed cap sheet and flashings in the following manner:
 - 1. Remove all dirt, dust, and other loose debris from the roof. Area to be coated must be a clean, sound, and dry surface.
 - 2. Prime roof surface prior to application of reflective coating at a rate of 200-400 sq ft. /gal.
 - 3. Refer to manufacturer's installation procedures and apply at a minimum of 3 gal./SQ.

3.5 REPAIR / RESTORATION

A. Repair of deficiencies:

1. Installations of details noted as deficient during Final inspection must be repaired and corrected by the Roofing Contractor and made ready for re-inspection, within five (5) working days of notification.

3.6 FIELD QUALITY CONTROL

A. Inspection:

1. Schedule inspections and notify the Architect, Owner's Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.

B. Manufacturer's field services:

Provide the services of a factory-authorized service representative to supervise the field assembly of components and installation of products or systems and related connections specified within this section, with weekly reports of the results in writing to the Architect.

3.7 **CLEANING**

- Clean in accordance with Specification Section PROJECT CLOSEOUT. A.
 - Clean any soiled surfaces at the end of each day, minimum. 1.
 - 2. Finish shall be clean and ready for the application of any additional finishes.

3.8 **PROTECTION**

- A. Protection from weather:
 - Protect newly installed work from freezing for 24 hours after erection, installation or application.
- Protection from traffic: В.
 - Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

CCHEDIH EC / EODMC 3.9

. WHEREAS	1	WHEREAS	of
membrane and associated materials and approved all other related materials ("materials' on the following project: a. Owner:	1.		
b. Address: c. Building Name/Type: d. Address: e. Area of Work: f. Acceptance Date: g. Warranty Period: 10 years from date of Substantial Completion. h. Expiration Date: i. Roofing Installer:		membrane and associated material	
b. Address: c. Building Name/Type: d. Address: e. Area of Work: f. Acceptance Date: g. Warranty Period: 10 years from date of Substantial Completion. h. Expiration Date: i. Roofing Installer:		a. Owner:	
c. Building Name/Type:			
e. Area of Work:		c. Building Name/Type:	
e. Area of Work:		d. Address:	
 g. Warranty Period: 10 years from date of Substantial Completion. h. Expiration Date: i. Roofing Installer: 			
h. Expiration Date:i. Roofing Installer:		f. Acceptance Date:	
h. Expiration Date:i. Roofing Installer:		g. Warranty Period: 10 years fr	rom date of Substantial Completion.
i. Roofing Installer:			-
		Installer:	
j. Contractor			

- performed under direction of Manufacturer's Authorized Service Representative, as described below:
 - Roof Inspection Report: Provide roof inspection and report of roof conditions based upon roof inspections.

- b. Special Post-Storm Roof Inspection Report: Roof inspection at Owner request following major storm activity.
- c. Roof Housekeeping: Inspect roof membrane, drains, gutters, and scuppers. Remove, bag and properly dispose of all debris.
- d. Roof Membrane Preventive Maintenance and Repair: Repair tears, splits and breaks in the roof membrane with appropriate repair mastic and membranes in accordance with Membrane Manufacturer's written repair and maintenance guidelines. Dress up reflective coatings on flashings. Coat all exposed reinforcing membranes with approved mastics.
- e. Roof Flashing Preventive Maintenance:
 - Metal Edge and Flashing Components: Repair tears, splits, and breaks in membrane flashings and open flashing strip-ins with appropriate repair mastics and membranes. Secure loose metal edge cleats and clips. Tighten and reseal exposed fasteners.
 - Parapet, Wall, and Counterflashing Systems: Repair tears, splits, and breaks in metal flashings and open flashing strip-ins with appropriate repair mastics and membranes. Coat all exposed reinforcing membranes with approved mastics. Tighten and reseal exposed fasteners. Clean and seal voids in termination bars, counterflashings and parapet caps. Secure loose termination bars and counterflashings. Check and re-secure loose metal coping caps.
 - 3) Equipment/Projection Flashing Components: Repair tears, splits, and breaks in metal flashings and open flashing strip-ins with appropriate repair mastics and membranes. Secure unsecured roof top equipment. Tighten and reseal exposed fasteners. Clean and seal voids in termination bars. Refill pitch pans. Check and reseal metal projections (hoods and clamps).
- f. Drainage Systems Preventive Maintenance: Check and re-secure drain bolts and clamping rings. Advise owner of missing drain dome strainers. Check strip-ins around drain leads and coat with approved mastic. Check gutter straps, joints and strip-ins. Check inside and exterior of scuppers for open solder or caulking seals.
 g. Roof Systems Leak Response:
 - 1) In the event of a roof system leak, Manufacturer shall provide to Owner:
 - a) Toll free 800 number for Owner for leak report, monitored twenty-four hours per day, 365 days a year.
 - b) Response to Owner on all leak calls within twenty-four hours.
 - c) Qualified repair crew at the building site within two business days of call.
 - d) Follow-up inspection by Manufacturer's Authorized Service Representative with written report to Owner.
 - e) Written summary of leak events, repairs, and inspections to Owner at end of each quarter in which leaks have occurred.
- h. Roofing System Continuing Management and Maintenance Services repair coverage exclude such damage to the roof system excluded from the Manufacturer's Warranty as a result of negligence, vandalism, or other excluded cause as described in manufacturer's published terms and conditions at the original date of this Contract.

\mathbf{N}	MANUFACTURER agrees to provide the above-desc	cribed services for the time period
in	ndicated for the lump sum of	and no/dollars
(\$	\$).
S	SUBMITTED thisday of	, 20
a.	a. Authorized Signature:	
b.	o. Name:	
c.	mr. 1	
d.		

e.	Address:	
f.	Telephone number:_	

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 076000- SHEET METAL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Sheet Metal materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 05 12 00 STEEL AND FABRICATIONS
 - 4. 06 10 00 ROUGH CARPENTRY
 - 5. 06 41 23 MODULAR CASEWORK
 - 6. 07 21 00 INSULATION
 - 7. 07 51 13 BUILT-UP ROOFING
 - 8. 07 72 00 ROOF ACCESSORIES
 - 9. 07 92 00 SEALANTS
 - 10. 08 11 00 METAL DOORS AND FRAMES
 - 11. 09 24 00 CEMENT PLASTER
 - 12. 09 91 00 PAINTING
 - 13. 10 05 00 MISCELLANEOUS SPECIALTIES
 - 14. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

- 1. DOD Department of Defense
- 2. LIA Lead Industries Association.
- 3. NRCA National Roofing Contractors Association
- 4. SMACNA Sheet Metal and Air Conditioning Contractor's National Association, 6th Edition, Architectural Sheet Metal Manual.
- 5. SSPC The Society of Protective Coatings

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Shop Drawings.
 - a. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work.
 - 2. Closeout Submittals in accordance with Specification Sections in Division One:
 - a. Warranty in accordance with Specification Section WARRANTIES.

1.4 QUALITY ASSURANCE

A. Qualifications:

- 1. Material Qualifications:
 - a. Work shall be in accordance with Standards and details set forth in latest edition of the SMACNA Manual and Specifications unless indicated otherwise.
 - b. The roofing manufacturer and installer selected for this project will select the roof flashing material and detailing for all roof penetrations compatible with the roofing system used and the warranties required. The schedule for roofing penetrations at the end of this section and the details contained within the drawings are minimum standards required for this project.

2. Installer Qualifications:

a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

B. Regulatory Requirements:

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

1.5 PROJECT CONDITIONS

A. Existing Conditions:

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

1.6 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
 - a. Warranty Period Five (5) Years.

C. Installer's Warranty:

- 1. Workmanship and Materials Warranty:
 - a. Warranty Period Five (5) years.
 - b. Upon project completion and acceptance, the subcontractor shall issue Owner a warranty against defective workmanship and materials.

SHEET METAL 2123

- c. The subcontractor shall warranty to maintain the roof flashing in a watertight condition for the period of years specified from the date of acceptance and shall be responsible for the repair of any failure that is the result of defects in materials and workmanship.
- d. The subcontractor shall obtain from the Roofing Installer and the General Contractor a co-endorsement of the Warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified product manufacturer:
 - a. Ice and Water Shield:
 - 1) GRACE CONSTRUCTION PRODUCTS
 - a) ICE and WATER SHIELD HT.
 - 2) Acceptable alternative manufacturers:
 - a) CARLISLE COATINGS & WATERPROOFING CCW WIP 400.
 - b. Penetration Flashing:
 - 1) GRACE CONSTRUCTION PRODUCTS "VYCOR V40."
 - 2) Acceptable Alternative Manufacturer:
 - a) FORT-I-FIBER "Fort-I-Flash 40."
 - b) TYVEK "FlexWrap" and "Straight Flash."
 - c. Reglets:
 - 1) FRY REGLET CORPORATION.
 - d. Primer Paint:
 - 1) DEVOE COATINGS PAINT.
 - e. Galvanized Repair Paint:
 - 1) RECTORSEAL.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Sheet Metals:
 - 1. Steel Sheet:
 - a. Zinc-Coated, Commercial quality with 0.20 percent copper, ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process," G-90 hot-dip galvanized, mill phosphatized where indicated for painting; 0.0359 inch thick (20 gage) minimum, except as otherwise indicated.
 - 2. Lead Sheet:

a. ASTM B 749 "Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products," Type L51121, copper-bearing sheet lead, minimum 4 lb/sq. ft. (0.0625 inch thick) minimum for burning (welding) unless otherwise indicated.

3. Aluminum Sheet:

- a. Provide sheet aluminum in accordance with ASTM B 209 "Specification for Aluminum and Aluminum-Alloy Sheet and Plate," alloy 3003, temper H14, AA-C22A41 clear anodized finish.
 - 1) Gage: 0.063 inches.
 - 2) Prepare anodized finish for application of primer and finish coats as indicated on the drawings.

4. Stainless-Steel Sheet:

a. ASTM A 167 "Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip," Type 304, soft annealed, with No. 4 finish, except where harder temper is required for forming or performance; minimum 0.0625 inch thick (16 gage), unless otherwise indicated.

2.3 MANUFACTURED UNITS

A. Reglets:

- 1. General: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces and compatible with flashing indicated.
- 2. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
- 3. Plaster Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
- 4. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
- 5. 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.
- 6. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of the counterflashing lower edge.
 - a. Material: Galvanized steel, thickness matching material being installed, unless otherwise noted.

2.4 ACCESSORIES

A. Solder:

- 1. Solder for galvanized steel:
 - a. ASTM B 32 "Specification for Solder Metal," Grade Sn50, used with rosin flux.
- 2. Solder for stainless steel:
 - a. ASTM B 32 "Specification for Solder Metal," Grade Sn60, used with an acid flux of type recommended by stainless-steel sheet manufacturer; use a noncorrosive rosin flux over tinned surfaces.

B. Stainless Steel Welding Rods:

1. Type recommended in writing by stainless-steel sheet manufacturer for type of metal sheets furnished

C. Fasteners:

SHEET METAL 2123

- 1. Same material as sheet metal or other non-corrosive metal as recommended by sheet metal manufacturer, unless otherwise indicated on the drawings.
 - a. Match finish of exposed heads with material being fastened.

D. Electrolytic Insulation:

- 1. Asphalt Mastic:
 - a. SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil (0.4-mm) dry film thickness per coat.
- 2. Other electrolytic insulation materials:
 - a. Asphalt impregnated felt, neoprene or EPDM rubber.
- E. Sealants shall be in accordance with Specification Section SEALANTS.
 - 1. Mastic Sealant:
 - a. Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
 - 2. Elastomeric Sealant:
 - a. Generic type recommended by sheet metal manufacturer and fabricator of components being sealed.
 - 3. Epoxy seam sealer:
 - 2-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.

F. Adhesives:

1. Type recommended by sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of sheet metal.

G. Metal Accessories:

1. Provide sheet metal clips, straps, anchoring devices, screens, mesh, and similar accessory units as required for installation of work, matching or compatible with material being installed; noncorrosive; size and thickness matching material being installed.

H. Roofing Cement:

- 1. ASTM D 4586 "Specification for Asphalt Roofing Cement, Asbestos Free," Type I.
 - a. Verify with roofing material utilized for this project as being compatible with materials and roofing manufacturer's warranty requirements.
- I. Gutter Sealing System (when applicable):
 - 1. Primer:
 - a. Suitable for metal gutter metal type and compatible with Coatings and Fabrics.
 - 2. Base, Intermediate and Finish Layer Coating:
 - 3. Base Layer Fabric:
 - a. Polyester Fabric compatible with primer and coatings.

J. Penetration Flashing:

- Self-Adhered and self-healing weather barrier strips, in accordance with FS UU-B-790a, Grade A.
 - a. 40 mil. minimum thickness, in 9 inch and 12 inch widths as is appropriate for the barrier application.

2.5 FABRICATION

- A. Sheet Metal Fabrication Standard: Fabricate sheet metal to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.
 - 1. Comply with details shown to fabricate sheet metal that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 2. Form exposed sheet metal work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.
 - 3. Seams:
 - a. Fabricate nonmoving seams in sheet metal with "Drive Cleat" or "Lock" seams.
 - 4. Expansion Provisions:
 - a. Space movement joints at maximum of 10 feet (3 m) with no joints allowed within 24 inches of corner or intersection.
 - b. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
 - c. Gutter Expansion control and design, unless otherwise indicated on the drawings:
 - 1) Ends of a gutter shall occur no more than fifty (50) feet apart with at least one downspout in between, and gapped in accordance with Chapter 1, Table 1-7.
 - 2) Adjacent ends shall be telescoped or enclosed with covers in a manner to accommodate expansion as indicated in Chapter 1, Fig. 1-5 to 1-7 and 1-10.
 - 5. Sealed Joints:
 - a. Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 - 6. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.
 - 7. Conceal fasteners and expansion provisions where possible.
 - a. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
 - 8. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
 - a. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

2.6 FINISHES

- A. Shop Finishing:
 - 1. All exterior galvanized sheet metal, unless specified otherwise, shall have all surfaces, except surfaces receiving roofing felt, properly cleaned and prepared and then painted with one coat Galvanized Metal Primer prior to installation.
 - a. Galvanized Metal Primer: 4020PF "DEVGUARD," or approved equivalent.
 - b. Galvanized repair paint: High-Zinc-Dust-Content, in accordance with SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight paint for re-galvanizing welds and repair painting galvanized steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

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

3.2 PREPARATION

A. Coordination:

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

B. Protection:

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

C. Surface preparation:

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

3.3 INSTALLATION

A. General:

- 1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
- 2. In accordance with approved submittals.
- 3. In accordance with Regulatory Requirements.
- 4. Set plumb, level, and square.
- 5. Structurally reinforce and anchor work as required.
- 6. Work shall be weather and water tight as required.
- 7. Where dissimilar metals come into surface contact, cover surface in contact with electrolytic insulation.
- 8. Immediately following installation, and prior to roofing application, the metal will be primed with a quick drying primer compatible with roofing system installed and in compliance with roofing manufacturer's warranty requirements.

B. Layout:

- 1. Lines shall be straight and true.
- 2. Field mitered joints shall be neat, true to line, and water tight.
- 3. Fastening:

- a. In accordance with approved shop drawings.
- 4. Sealants:
 - a. Seal all joints with sealant.

C. Assistance:

1. Installation shall be in direct consultation and review of roofing system manufacturer where applicable.

D. Penetration Flashing:

- 1. Apply Penetration Flashing in conjunction with Water Barriers, Metal Accessories and all other related work.
- 2. Install Penetration Flashing at all openings and penetrations at all exterior walls and at interior walls considered to be "Semi-Wet" and "Wet" exposures (i.e., Toilets, Showers, Lockers, Kitchens, etc.).
- 3. Install Penetration Flashings with Water Barriers, Metal Accessories and all other related work in "shingle" or "weatherboard" fashion.
- 4. Penetration Flashings shall be installed as required in CBC Sections 1404 in 9" widths and continuous to 9" past all intersections around all openings, penetrations and termination of Sheet Metal Systems.
 - a. Should any penetration warrant a greater width of wall flashing, provide 12" wide flashing as required.
 - b. When an object extends through the Sheet Metal System, return the edge of the Penetration Flashing 1" and apply to the sides of the penetrating item.
- 5. Objects such as electrical back-boxes, electrical speaker enclosures, penetrations created by structural members, and the like.

3.4 CLEANING

- Clean in accordance with Specification Section PROJECT CLOSEOUT.
 - 1. Clean any soiled surfaces immediately.
 - 2. Finish shall be clean and ready for the application of any additional finishes.

3.5 SCHEDULES

- A. The Schedules are divided into "Architectural" Sheet Metal Items and "Utility" Sheet Metal Items:
 - 1. Architectural Sheet Metal Items: Those items visible from the interior occupied spaces and from all exterior viewing positions. Fabrication of all Architectural Items shall provide a fully finished appearance on all visible surfaces. Fabrication shall be soldered or welded joints and ground smooth. Solid flat head riveted joints may be used if necessary, but limited in use and must be indicated on the shop drawings by the fabricator, and accepted by the Architect. The use of sheet metal screws, pop rivets, or bolts are not be permitted. All joints between section shall be uniformly gapped with a maximum of 1/16" and splice backing shall be centered on the joint.
 - 2. Utility Sheet Metal Items: Those items not visible from the interior occupied spaces nor from exterior viewing positions. Fabrication of all Utility Items shall be in accordance with SMACNA Standards and shop practices.
- B. Sheet Metal Schedules should be used as a guide only and it is not considered as a complete list. Refer to Drawings for locations of all conditions requiring sheet metal items.

- C. Multiple types of material are specified for various items in the Schedules. Verify with roofing manufacturer as to which material shall be used to be compatible to the roofing material provided and to satisfy roofing warranty requirements.
- D. Materials gages specified for Items in the Schedules are minimum and shall be provided unless otherwise noted on the Drawings.
- E. Schedule's Remarks / SMACNA No., 6th Edition, and are references of the standards for fabrication. Refer to Drawings for configurations and other fabrication requirements of sheet metal items.

F. Architectural Sheet Metal Items

F. Architectural Sheet Metal Items								
"ARCHITECTURAL" SHEET METAL ITEMS								
ITEM	LOCATIO N	MAT.	GA.	FINISH	REMARKS / SMACNA NO., 6 th Edition			
Parapet Cap	Parapet Walls	Steel	20	Shop	Chapter 3, similar to Fig. 3-4A or Fig. 3-4G with E-1 and E-4 edge styles, as indicated on drawings. Provide J9 "Drive Cleat" joints, typical.			
Cap Coping	Parapet Walls	Steel	20	Shop	Chapter 3, similar to Fig. 3-4G with E-4 edge style, as indicated on drawings. Provide J9 "Drive Cleat• " joints, typical.			
Drip Flashing	Various Conditions	Steel	22	Shop	Chapter 4, minimum 4" under finish and minimum 4" cover. Provide J2 "Butt & Backup Plate" • joints with 1/16" gap. Fabricate Transition pieces and End Caps.			
Counter Flashing	Various Conditions	Steel	22	Shop	Chapter 4, minimum 4" under finish and minimum 4" cover with 3/4" hemmed drip. Provide J2 "Butt & Backup Plate• " joints with 1/16" gap. Fabricate Transition pieces and End Caps.			
Opening Heads, Jambs & Sill Flashing	Metal Frames	Steel	22	Shop	Weld and Grind smooth all joints			
Opening Heads, Jambs & Sill Flashing	Aluminum Windows	Alum	0.0253	Match Aluminum Window Finish.	Seal all joints.			
Opening Heads, Jambs & Sill Flashing	Storefront	Alum	0.0253	Match Storefront Finish.	Seal all joints.			
Opening Heads, Jambs & Sill	Curtain Wall	Alum	0.0253	Match Curtain Wall Finish.	Seal all joints.			

"ARCHITECTURAL" SHEET METAL ITEMS							
ITEM	LOCATIO N	MAT.	GA.	FINISH	REMARKS / SMACNA NO., 6 th Edition		
Flashing							
Wall Penetration Flashing	Exterior Wall	Steel	22	Shop	Similar to Chapter 6, Figures 6-36, 37, 38 & 39.		
Scuppers	Parapet Wall	Steel	22	Shop	Chapter 1, similar to Fig. 1-26A-B or 1-30A-B.		
Gutters	Exterior	Steel	18	Shop	Chapter 1, Fig. 1-1. Provide expansion joints similar to Fig. 1-7. Solder overflow and downspout outlets.		
Conductor Head	Exterior	Steel	18	Shop	Chapter 1, similar to Fig. 1-25. Solder downspout outlet.		
Down Spouts	Exterior	Steel	18	Shop	Chapter 1, similar to Fig. 1-31, 1-32A or B. Provide Fig. 1-35B or J hangers.		
Fascia Panels	Exterior	Steel	18	Shop	Weld and grind smooth all joints.		
Color Band Panels	Exterior	Steel	18	Shop	Weld and grind smooth all joints.		
Serving Counter	Serving Counter	S.S.	16	#4	Weld and Grind smooth all joints		
Work Counter	Work Counter	Steel	16	Shop	Weld and Grind smooth all joints		
Fabricated Tilt Mirror	Student Restrooms	S.S.	16	#4	Weld and grind smooth all joints.		

G. Utility Sheet Metal Items

"UTILITY" SHEET METAL ITEMS						
ITEM	LOCATIO N	MAT.	GA.	FINISH	REMARKS / SMACNA NO., 6 th Edition	
Clips & Cleats	Various Conditions	Steel	22	Shop		
Parapet Boot Flashing	Parapet Cap & Cap Coping	Steel	18	Shop	Solder all joints. Minimum 4" under finish and min. 4" cover.	
Counter Flashing	Various Conditions	Steel	22	Shop	Minimum 4" under finish and min. 4" cover with ¾" hemmed drip. Provide J2 "Butt & Backup Plate" joints with 1/16" gap. Fabricate Transition pieces and End Caps.	
Reglet & Counter Flashing	Plaster Parapets	Steel	24	Shop	FRY Spring Lock Type "ST" with "Spring-Loc" Flashing. Preformed transition pieces and end caps.	
Reglet & Counter Flashing	Plaster Parapets	Steel	24	Shop	FRY Spring Lock Type "STX" with "Spring-Loc" Flashing. Preformed transition pieces and end caps.	
Reglet &	Masonry	Steel	24	Shop	FRY Spring Lock Type "MA" with	

"UTILITY"	SHEET MET	AL ITE	MS		
ITEM	LOCATIO N	MAT.	GA.	FINISH	REMARKS / SMACNA NO., 6 th Edition
Counter Flashing	Parapet				"Spring-Loc" Flashing. Preformed transition pieces and end caps.
Reglet & Counter Flashing	Masonry Parapet	Steel	24	Shop	FRY Spring Lock Type "SM" with "Spring-Loc" Flashing. Preformed transition pieces and end caps.
Structural Support Flashing	Roof Penetratio n	Steel	18	Shop	Chapter 4, Similar to Figures 16A or B or C if welded or soldered, and grind smooth.
Vent Pipe Flashing	Roof Penetratio n	Lead or Steel	4#/sf or 22	Shop	Chapter 4, Fig. 4-15B.
Pipe or Conduit Flashing	Roof Penetratio n	Lead or Steel	4#/sf or 22	Shop	Chapter 4, similar to Figure 4-15C.
Multiple Pipe or Conduit Flashing	Roof Penetratio n	Lead or Steel	4#/sf or 22	Shop Or Shop	Chapter 4, similar to Figure 4-15A or 4-15B.
Insulated Pipe Flashing	Roof Penetratio n	Lead or Steel	4#/sf or 22	Shop	Chapter 4, Similar to Fig. 4-15C. Refer to Plumbing.
Mechanical Flue Pipe Flashing	Roof Penetratio n	Lead or Steel	4#/sf or 22	Shop	Chapter 4, Similar to Fig. 4-15C. Refer to Plumbing.
Manufactur ed Curb Flashing	Roof Penetratio n	Steel.	22	Shop	Provide formed metal corners lapped 6" with sheet metal screws with neoprene washers at 18" o.c.
Hatch Flashing	Roof Penetratio n	Steel.	22	Shop	Provide formed metal corners lapped 6" with sheet metal screws with neoprene washers at 18" o.c.
Ventilating Units Flashing	Roof Penetratio n	Steel.	22	Shop	Provide formed metal corners lapped 6" with sheet metal screws with neoprene washers at 18" o.c.
Scuppers	Parapet Screens	Steel.	22	Shop	Chapter 1, similar to Fig. 1-26A-B or 1-30A-B.
Roof Splash Pans	Roof	Steel.	22	Shop	Chapter 1, Fig. 1-36, 2-rib corrugation section
Valley Flashing	Metal Panel Roof	Steel.	22	Shop	Chapter 6, Similar to Fig. 6-6 or Fig. 1-21 or Fig. 1-23, Detail 10, or Fig. 6-9, Detail 7 and Chapter 4, Fig. 4-10.
Built-in Gutter	Metal Panel Roof	S.S.	16	Shop	Chapter 1, similar to Fig. 1-4 or Fig. 1-21 or Fig. 1-23. Provide expansion joint similar to Fig. 1-8. Weld and grind smooth all joints.
Louver Screens	Louvered Openings	Steel.	14	Shop	Chapter 7, Fig. 7-7A or B. Provide 12 gage (0.105) 3 x 3 welded wire mesh.
Plumbing Sheet Metal	Various Plumbing Conditions	Steel.	22	Shop	Refer to Plumbing Drawings and Specifications.
Mechanical	Various	Steel.	22	Shop	Refer to Mechanical Drawings and

"UTILITY" SHEET METAL ITEMS							
ITEM	LOCATIO	MAT.	GA.	FINISH	REMARKS / SMACNA NO., 6th		
	N				Edition		
Sheet	Mechanical				Specifications.		
Metal	Conditions						
Electrical	Various	Steel.	22	Shop	Refer to Electrical Drawings and		
Sheet	Electrical				Specifications.		
Metal	Conditions						
Roof and	Roof	Lead	#4	Shop	See Details.		
Overflow							
Drain							
Pans							
Mechanical	Roof	Steel	22	Shop	Chapter 4, Detail 4-14A.		
, Large	Penetratio						
Flue	n						
Flashing							

END OF SECTION

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all roof accessory materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 05 12 00 STEEL AND FABRICATIONS
 - 4. 06 10 00 ROUGH CARPENTRY
 - 5. 07 51 13 BUILT-UP ROOFING
 - 6. 07 60 00 SHEET METAL
 - 7. 07 92 00 SEALANTS
 - 8. 09 91 00 PAINTING
 - ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

- 1. In accordance with the following standards:
 - a. ASTM American Society for Testing and Materials
 - b. LIA Lead Industries Association.
 - c. NRCA National Roofing Contractors Association (If the roofing system scheduled to be installed calls for related sheet metal flashing to be in accordance with NRCA detailing in order to satisfy their warranty requirements, then the NRCA detailing shall govern in lieu of SMACNA standards.)
 - d. OSHA Occupational Safety and Health Administration
 - e. SMACNA Sheet Metal and Air Conditioning Contractor's National Association, latest Edition, Architectural Sheet Metal Manual.

1.3 SYSTEM DESCRIPTION

- A. (Manufactured Curbs Only) This section specifies curbs for mechanical and electrical equipment specified in Division 23 and Division 26, as well as architectural curbs in Division 05, Division 07 and Division 08. These curbs are designed and fabricated as welded single piece units that are structurally designed by the manufacturer to span structural framing. The curbs require structural calculations from the manufacturer in accordance with the CBC for the mechanical or electrical units supplied that are mounted on top of the curbs.
 - 1. Manufactured curbs shall be designed, engineered, and fabricated for exact mechanical units selected after bid, and can be designed for compound slopes and difficult roofing conditions. Designs shall accommodate each type of roofing condition.
 - 2. All curbs shall be designed to be a minimum of 8-inches above the finished roof at the top most portion of the curb, and designed with crickets for watertight connections.

3. Construct curbs to match roof slopes with plumb and level top surfaces for mounting mechanical or electrical equipment.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Coordination Drawings (Manufactured Curbs only):
 - a. Manufacturer(s) shall coordinate with the Contractor and the Roofing Subcontractor all applicable work placed on or penetrating the roof deck and roof membrane system for the proper selection of Roof Accessories for this project. Manufacturer shall coordinate with the Contractor all weights and dimensions from approved shop drawings of mechanical equipment and piping/conduit required for this project and fabricate accordingly. All items coordinated (including Structural Calculations) shall be presented within the shop drawings for the Architect's and Structural Engineer of Record's review.
 - 2. Product Data.
 - a. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
 - b. Submit manufacturer's standard color range for selection by the Architect.
 - 3. Shop Drawings.
 - a. Submit shop drawings prepared by, or under the supervision of a registered Civil or Structural Engineer in the State of California, detailing fabrication and assembly of the work under this section, as well as procedures and diagrams. Include setting drawings, templates, and directions for installation of anchor bolts and other anchorage to be installed as unit of work of other related sections.
 - 1) Manufactured Curbs must be coordinated with the Structural Shop Drawings and Mechanical / Electrical Equipment supplied as to size and weights for any roof top installation.
 - 4. Quality Assurance/Control Submittals:
 - a. Manufacturer's Written Instructions:
 - 1) Manufacturer's written instructions.
 - 5. Closeout Submittals in accordance with the following:
 - Maintenance Data in accordance with Specification Section PROJECT CLOSEOUT.
 - b. Operation Data in accordance with Specification Section PROJECT CLOSEOUT.
 - c. Record Documents in accordance with Specification Section RECORD DOCUMENTS.
 - d. Warranty in accordance with Specification Section WARRANTIES.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - 2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- B. Regulatory Requirements:

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

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 - 1. Products shall be individually wrapped.
 - 2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
- B. Acceptance at Site:
 - 1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
 - 2. Damaged products will not be accepted.
- C. Storage and protection:
 - 1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. Hatch Railing System shall provide a warranty against defects in material and workmanship:
 - a. Warranty Period Twenty-Five (25) Years.
 - 1) From the Date of Substantial Completion.
- C. Installer's Warranty:
 - Weather Tightness Warranty for Roof Accessories: Manufacturer's Standard form in which manufacturer agrees to repair or replace Roof Accessory assemblies that fail to remain weathertight, including leaks within specified warranty period. Warranty shall guarantee manufactured Roof Accessories to be free from defects in materials or workmanship.
 - a. Warranty Period Five (5) Years.
 - 1) From the Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified Manufactured Curb product manufacturer, or approved equivalent:
 - a. ROOF PRODUCTS, INC.
 - 1) RP Series to match specified products.
 - b. Acceptable alternative manufacturers:
 - 1) ROOF PRODUCTS & SYSTEMS CORP.
 - 2. Specified Roof Hatch Railing System manufacturer, or approved equivalent:
 - a. BILCO COMPANY:
 - 1) "Bil-Guard."
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MANUFACTURED UNITS

- A. Manufactured Curbs:
 - 1. General:
 - a. Curbs shall be constructed to match roof slope of roof and provide a level top surface for mounting of mechanical equipment.
 - 1) Minimum height of all curbs shall be 8 inches above finished roof per NRCA requirements.
 - b. Provide ROOF PRODUCTS, INC., Model Numbers as follows:
 - 1) RPC Series for Built-up Roofs.
 - 2) RPMB Series for Metal Roofs.
 - 3) RPES Series for Equipment Supports.
 - 2. Equipment Curbs: Provide ROOF PRODUCTS, INC., Model Numbers as follows:
 - a. RPC-5 for Built-up roofs.
 - b. RPMB-5 for Metal Roofs.
 - c. Factory installed pressure treated wood nailers.
 - d. Welded 18 gage minimum galvanized steel shell and base plate, as applicable to roof equipment situation, with continuous mitered and welded corner seams.
 - e. 3 lb. density rigid fiberglass insulation board.
 - f. Internal angle reinforcing (1" x 1" x 12 gage) on sides greater than 36 inches in length, spaced 24 inches o.c.
 - g. All welds to be coated with manufacturer's "Alumanation 100."
 - h. Internal curb duct supports as required for the type of Mechanical units selected for the project.
 - 3. Equipment Platform: Provide ROOF PRODUCTS, INC., Model Numbers as follows:
 - a. RPPF-5 for Built-up Roofs.
 - b. RPMB-5 for Metal Roofs.

- c. Factory installed pressure treated wood nailers.
- d. Welded 18 gage minimum galvanized steel shell and base plate, as applicable to roof equipment situation, with continuous mitered and welded corner seams.
- e. 3 lb. density rigid fiberglass insulation board.
- f. Internal angle reinforcing (1" x 1" x 12 gage) on sides greater than 36 inches in length, spaced 24 inches o.c.
- g. All welds to be coated with manufacturer's "Alumanation 100."
- h. Internal curb duct supports as required for the type of Mechanical units selected for the project.
- i. Platform Cover:
 - 1) Welded 18 gage galvanized steel construction.
 - 2) Cover cross broken for positive water run-off.
 - 3) Flared drip edge.
 - 4) Flat Lock and Soldered seams on covers 43 inches x 105 inches and larger.
- j. Platform: Provide 1-1/8" thick fire-retardant treated T & G plywood top sheathing
- k. Vapor Retarder: Two layers of 15lb building paper between plywood platform and curb cover.
- 4. Equipment Supports: Provide ROOF PRODUCTS, INC., Model Numbers as follows:
 - a. RPES-3 for Built-up Roofs.
 - b. 18 gage minimum galvanized steel shell, base plate and counterflashing.
 - c. Factory installed pressure treated wood nailer.
 - d. Internal bulkhead re-enforcement.
 - e. All welded construction.
 - f. Vapor Retarder: Two layers of 15lb building paper between wood nailer and counterflashing.

5. Accessories:

- a. Square to Round adapter as indicated on the drawings:
 - 1) Cross broken for positive run-off.
 - 2) Type WG 16 gage galvanized steel construction.
 - 3) Watertight construction.
 - 4) Insulated to prevent condensation.
- b. "Dectite" size and number applicable to the size of pipes penetrating the roof deck indicated in the Contract Documents.
- c. Fasteners as required by the manufacturer for the proper installation of the roof curbs and weather resistant coating as standard with the manufacturer.
- d. Neoprene strips, sheets or washers as required by the manufacturer for weathertight construction.
- e. Provide Isolation Rails as required by Mechanical in DIV. 23 or Electrical in DIV. 26.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

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

3.2 PREPARATION

A. Coordination:

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

B. Protection:

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

C. Surface Preparation:

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

3.3 INSTALLATION

A. General:

- 1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
- 2. In accordance with approved submittals.
- 3. In accordance with Regulatory Requirements.
- 4. Set plumb, level, and square.
- 5. Damaged products shall not be installed.

B. Layout:

1. Lines shall be straight and true.

3.4 FIELD QUALITY CONTROL

A. Site Tests:

1. As required by Regulatory Requirements.

B. Inspection:

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

3.5 ADJUSTING

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

3.6 CLEANING

- A. Clean in accordance with Specification Section PROJECT CLOSEOUT.
 - 1. Clean any soiled surfaces immediately.

- 2. Finish shall be clean and ready for the application of any additional finishes.
- 3. In accordance with manufacturer's written instructions and recommendations.

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 079200 – SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all joint sealant materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 SYSTEM DESCRIPTION

- A. Performance Requirements: It is the intention of this specification section and the drawings to form a guide for a complete and operable system. Any items not specifically noted but necessary for a complete and operable system shall be provided under this section.
 - 1. Provide elastomeric sealants for exterior applications that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.
 - 2. Provide sealants for interior applications that have been produced and installed to establish and maintain airtight continuous seals that are water-resistant and cause no staining or deterioration of joint substrates.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product data from manufacturers for each joint sealant product required.
 - 2. Shop drawings:
 - a. Provide full details of all sealants and accessories proposed for use for approval by the Architect. All materials and products proposed shall be compatible with each other and with the substrates and adjacent wall colors, and shall be non-staining and non-bleeding. Submit an affidavit from the manufacturer confirming the acceptance of the use of the selected products in the manner and on the substrates proposed.
 - 3. Samples.
 - a. Samples for initial selection purposes in form of manufacturer's bead samples, consisting of strips of actual products showing full range of colors (standard, premium and custom) available, for each product exposed to view.
 - 1) Provide color chips of adjacent wall surface colors; to be used in evaluating the sealant color samples.
 - 4. Quality Assurance/Control Submittals:
 - a. Provide UL Assembly Classification appropriate for each fire rated penetration.

- b. Certificates:
 - 1) Submit three (3) copies of certificates.
 - a) Certification by each joint sealant manufacturer that sealants plus the primers and cleaners required for sealant installation comply with local regulations controlling use of volatile organic compounds.
 - b) Certified test reports for elastomeric sealants on aged performance as specified, including hardness stain resistance, adhesion, cohesion or tensile strength, elongation, low temperature flexibility, compression set, modulus of elasticity, water absorption, and resistance (aging, weight loss, deterioration) and heat and exposure to ozone and ultra violet light. Adhesion data shall include long-term adhesion characteristics of all adhesion surfaces including silicone, aluminum and glass coatings and long term weathering test on the silicone on contact with similar materials.
 - c) Certificate of Installation: Signed by the installer and sealant manufacturer stating that sealant installed complies with specifications, and that installation methods comply with manufacturer's printed instructions for each condition of installation and use on the project. The sealant installer shall have no less that five years of continuous experience in installing the specified products. Their experience shall include similar work to this subject project. In addition, the manufacturers will provide written approval of the material installers.
- c. Manufacturer's Written Instructions:
 - 1) Submit three (3) copies of manufacturer's written instruction
- d. Closeout Submittals in accordance with Specification Sections in Division One:
- e. Warranty in accordance with Specification Section WARRANTIES.

1.4 QUALITY ASSURANCE

A. Qualifications:

- 1. Material Qualifications:
 - a. Single Source Responsibility for Joint Sealant Materials: Obtain joint sealant materials from a single manufacturer for each different product required.
- 2. Installer Qualifications:
 - Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
- 3. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units and colors without causing delay in the work.

B. Regulatory Requirements:

- 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. AAMA American Architectural Manufacturer's Association
 - 1) AAMA 800-92 "VOLUNTARY SPECIFICATIONS AND TEST METHODS FOR SEALANTS.
 - b. ASTM American Society for Testing and Materials.
 - 1) ASTM C 1193 "STANDARD GUIDE FOR USE OF JOINT SEALANTS."
 - c. CA-CHPS California High Performance Schools

- d. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
- e. GANA Glass Association of North America, 1997 Edition of the Glazing Manual, and the most recent Edition of the Sealant Manual.
- f. SWRI Sealant Waterproofing Restoration Institute Types of standards as found in Chapter III "Sealants: The Professionals' Guide."

C. Meetings:

- 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with all other related work.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.
 - 1. Comply with the Sealant Requirements of the GANA Glazing Manual and GANA Sealant Manual.
- B. Store and handle materials in compliance with manufacturer's written recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.
 - 1. Store sealant containers in a protected location in accordance with their manufacturer's printed instructions until their use.

1.6 PROJECT CONDITIONS

- A. Environmental requirements:
 - 1. Apply materials within manufacturer's written recommended surface and ambient temperature ranges.
 - 2. Apply materials when working joints are most likely to be normal size.
 - 3. Do not install sealants under adverse weather conditions, or when temperatures are beyond manufacturer's written recommended limits.
 - a. Proceed with the installation only when forecasted weather conditions are favorable for proper sealant cure, and development of early bond strength. Allow a minimum of three days after rain.

b. Where joint width is affected by ambient temperature variations, install sealants only when temperatures are in the lower third of manufacturer's written recommended installation temperature range, so that sealant will not be subjected to excessive elongation and bond stress at low temperatures.

1.7 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
 - 2. Manufacturer shall warrant exterior joint sealant after substantial completion of work.
 - a. Warranty Period Ten (10) Years.
- C. Installer's Warranty:
 - 1. Sealant Contractor shall warrant sealants against defective materials and workmanship after substantial completion of work.
 - a. Warranty Period Five (5) Years.
 - b. Warranty shall further state that installed sealants are warranted against the following:
 - 1) Water leakage through sealed joints.
 - 2) Adhesive or cohesive failure of sealant.
 - 3) Staining of adjacent surfaces caused by migration of primer or sealant.
 - 4) Chalking or visible color change of the cured materials.
 - c. The installer shall make repairs during the warranty period at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified product manufacturer, or approved equivalent:
 - a. One-Part Neutral Cure Silicone Sealant:
 - 1) PECORA "#890"
 - a) NOTE: For continual immersion in water conditions, provide PECORA "Dynatred".
 - b) If the water contains a chlorine content of 5ppm, then PECORA "Synthacalk GC2+" shall be used.
 - 2) Acceptable alternative manufacturers for 1) only above:
 - a) BONDAFLEX "Sil 290"
 - b) DOW PERFORMANCE SILICONES "#790"
 - c) SONNEBORN "Sonolastic 150" or "Sonolastic 150 VLM"
 - b. One-Part Acid-Curing Silicone Sealant:
 - 1) PECORA "#860"

- 2) Acceptable alternative manufacturers:
 - a) BONDAFLEX "Sil 100 GP"
 - b) DOW PERFORMANCE SILICONES "#999-A"
 - c) SONNEBORN "Omniplus"
- c. One-Part Mildew-Resistant Silicone Sealant:
 - 1) PECORA:
 - a) White Color Only "#345"
 - b) Available in multiple colors for selection "#898"
 - 2) Acceptable alternative manufacturers to 1), a), above:
 - a) BONDAFLEX "Sil 100 WF"
 - b) DOW PERFORMANCE SILICONES "#786"
 - c) SONNEBORN "Omniplus"
- d. One-Part Gun Grade Urethane Sealant:
 - 1) PECORA "Dynatrol I-XL"
 - 2) Acceptable alternative manufacturers:
 - a) BONDAFLEX "Pur 25" or "Pur 25 Tex"
 - b) SIKA "Sikaflex 1a" or "Sika Textured"
 - c) SONNEBORN "NP1 Smooth" or "X1 Textured"
 - d) VULKEM "#116"
- e. Multi-Component Gun Grade Urethane Sealant:
 - 1) PECORA "Dynatred"
 - 2) Acceptable alternative manufacturers:
 - a) BONDAFLEX "Pur 2 NS"
 - b) SIKA "Sikaflex 2c NS"
 - c) SONNEBORN "NP2"
- f. Multi-Component Gun Grade Urethane Sealant (Fast Curing):
 - 1) PECORA "Dynatred"
 - 2) Acceptable alternative manufacturers:
 - a) BONDAFLEX "Pur 2 NS"
 - b) SIKA "Sikaflex 2c NS"
 - c) SONNEBORN "NP2" with manufacturer's accelerator.
 - d) VULKEM "#227"
- g. One-Part or Multi-Component Gun Grade Urethane Sealant (Security Sealant):
 - 1) PECORA "Dynaflex"
 - 2) Acceptable alternative manufacturers:
 - a) BONDAFLEX "Pur 2 NS"
 - b) SIKA "Sikaflex 2c NS TG"
 - c) SONNEBORN "Ultra"
- h. One-Part Pourable Self-Leveling Urethane Sealant:
 - 1) PECORA "Urexpan NR-201" or "Dynatred"
 - 2) Acceptable alternative manufacturers:
 - a) BONDAFLEX "Pur 35 SL"
 - b) SIKA "Sikaflex 1c SL"
 - c) SONNEBORN "Sonolastic SL 1"
 - d) VULKEM "#45"
- i. Multi-Component Pourable Self-Leveling Urethane Sealant (Fast Curing):
 - 1) PECORA "Urexpan NR-200"
 - 2) Acceptable alternative manufacturers:
 - a) BONDAFLEX "Pur 2 SL"
 - b) SIKA "Sikaflex 2c SL"
 - c) SONNEBORN "Sonolastic SL 2"
 - d) VULKEM "#245/255"
- j. Acrylic-Emulsion Sealant:

- 1) PECORA "AC-20"
- 2) Acceptable alternative manufacturers:
 - a) BONDAFLEX "Sil-A 700"
 - b) SONNEBORN "Sonolac"
- k. One-Part Butyl Sealant:
 - 1) PECORA "BC-158"
 - 2) Acceptable alternative manufacturers:
 -) PTI (by H.B. FULLER) "#707"
- 1. Acoustical Sealant:
 - 1) PECORA:
 - a) Exposed and Fire Rated areas; Pecora "AC-20 FTR"
 - b) Concealed areas: Pecora "AIS-919"
 - 2) Acceptable alternative manufacturers:
 - a) BONDAFLEX "Sil-A 700"
 - b) OSI "GRABBER" #GSCS
 - c) TREMCO INC. 834
 - d) W.W. HENRY "#413"
- m. Firestop Sealants: Use in designated Fire-Rated Assemblies in accordance with approved UL Classified Assemblies.
 - 1) HILTI
 - 2) Acceptable alternative manufacturers:
 - a) 3M
 - b) PECORA
- n. Firestop Putty Pads: Use in Fire-Rated Assemblies where penetration holes are too large for caulk, in accordance with approved UL Classified assemblies:
 - 1) HEVI-DUTY / NELSON "Putty Pads"
- o. Glazing Tape Sealants:
 - 1) Butyl Glazing Tape:
 - a) PECORA "Extru-Seal"
 - b) Acceptable alternative manufacturers:
 - c) TREMCO, INC. "440 Tape"
 - 2) Butyl Pressure Glazing Tape:
 - a) PECORA "Dyna-Seal"
- p. Pre-Compressed Foam Sealants:
 - 1) EMSEAL CORP. "Emseal"
- q. Sheet Caulking (Electrical Junction Box Sealers):
 - 1) LOWRY "Electrical Box Sealer"
 - 2) Acceptable alternative manufacturer:
 - a) TREMCO INC. "Sheet Caulking"
- r. EIFS preformed paintable Urethane Tape:
 - 1) SIKA "Sikaflex PUR" Tape System
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. General:
 - 1. Compatibility: Provide sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

- a. Colors: Provide color of exposed sealants to comply with the following:
 - 1) Sealant colors shall match adjacent wall color.
 - 2) Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.
- B. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing elastomeric sealants (Silicones, Urethanes, and Acrylics) that comply with ASTM C 920 "Specification for Elastomeric Joint Sealants," and other requirements indicated on each Elastomeric Joint Sealant listed, including those requirements referencing ASTM C 920 "Specification for Elastomeric Joint Sealants," classifications for Type, Grade, Class, and Uses.
 - 1. Additional Movement Capability: Where additional movement capability is specified in Elastomeric Joint Sealant listed, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719 "Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)," to withstand the specified percentage change in the joint width existing at time of installation.
- C. Acrylic-Emulsion Sealant: Provide product complying with ASTM C 834 "Specification for Latex Sealants," that accommodates joint movement of not more than 5 percent in both extension and compression for a total of 10 percent.
- D. Butyl Sealant: Manufacturer's standard one-part, non-sag, solvent-release-curing, polymerized butyl sealant complying with ASTM C 1311 "Standard Specification for Solvent Release Sealants," and formulated with minimum of 75 percent solids to be nonstaining, paintable, and have a tack-free time of 24 hours or less.
- E. Acoustical Sealant: Manufacturer's non-drying, non-bleeding and non-hardening butyl sealant complying with ASTM C 834 "Specification for Latex Sealants," and the following requirements:
 - 1. Product is effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies per ASTM E 90 "Test method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements."
 - 2. For fire rated conditions, use an acoustical sealant that has at least Class II Flame Spread and Smoke Developed ratings in accordance with ASTM E-84 "Test method for Surface Burning Characteristics of Building Materials," as follows:
 - a. Flame Spread Ratingb. Smoke Developed Rating117.
- F. Firestop Pillows / Bags: In accordance with UL Classified systems. 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.
- G. Firestop Sealants: In accordance with ASTM E 814 "Specification for Latex Sealants," and ANSI/UL 1479 Classified systems.
 - 1. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
 - 2. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.3 ACCESSORIES

A. Tape: Manufacturer's standard, solvent-free, butyl-based tape sealant with a solids content of 100 percent formulated to be nonstaining, paintable, and nonmigrating in contact with nonporous surfaces with or without reinforcement thread to prevent stretch and packaged on rolls with a release paper on one side.

- B. Pre-compressed Foam: Manufacturer's standard preformed, pre-compressed, impregnated open-cell foam sealant manufactured from high-density urethane foam impregnated with a nondrying, water repellent agent; factory-produced in pre-compressed sizes and in roll or stick form to fit joint widths indicated and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; and complying with the following requirements:
 - 1. Properties: Permanently elastic, mildew-resistant, nonmigratory, nonstaining, and compatible with joint substrates and other sealants.
 - 2. Impregnating Agent: Manufacturer's standard.
 - 3. Density: Manufacturer's standard.
 - 4. Backing: Pressure-sensitive adhesive factory applied to one side with protective wrapping.

C. Backing Rods (Joint Sealant Backing):

- 1. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- 2. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 - a. Open-cell polyurethane foam.
 - b. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
 - c. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
 - d. Any material indicated above.
- 3. Elastomeric Tubing Joint Fillers: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, capable of remaining resilient at temperatures down to -26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
- 4. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.
- 5. Acoustical Sheet Caulking for junction boxes: LOWRY'S Electrical Box Sealer, or TREMCO INC. sheet caulking

D. Miscellaneous Materials:

1. 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.

- 2. 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 in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.
- 3. Masking Tape: Non-staining, nonabsorbent material compatible with sealants and surfaces adjacent to joints. Use the type of masking tapes available that is compatible to the substrate being masked without damaging the surface material of finish when removed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

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

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing sealants to comply with recommendations of joint sealant manufacturer and the following requirements:
 - 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 sealants,
 oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 - 3. Remove laitance and form release agents from concrete.
 - 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of sealants.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written recommendations. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
 - 1. Masking Tape: Use the appropriate masking tape (type selected to the substrate so as not to mar the surface it is protecting) where required to prevent contact of sealant 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 INSTALLATION

A. General:

Comply with joint sealant manufacturer's written installation instructions applicable to
products and applications indicated, except where more stringent requirements apply.
Sealant Installation Standard: Comply with recommendations of ASTM C 1193
"Standard Guide for Use of Joint Sealants," for use of sealants as applicable to materials,
applications, and conditions indicated.

- a. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 "Practice for Use of Sealants in Acoustical Applications," as applicable to materials, applications, and conditions indicated.
- b. Use Urethane Sealants at painted joints.
- c. Use Silicone Sealants at exposed, non-painted joints.
- d. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
 - 1) Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability
 - a) Do not leave gaps between ends of joint fillers.
 - b) Do not stretch, twist, puncture, or tear joint fillers.
 - c) Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
 - 2) Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.
- e. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.
 - For normal moving joints not subject to traffic: Fill joints to a depth equal to 50% of joint width, but not less than 1/4" deep or more than 1/2" deep. In no case shall the applied sealant width exceed the sealant depth.
 - 2) Assure that the *bond line* surface is a minimum of 1/4" wide. Install approved backer material at a proper depth to provide sealant bead profiles as detailed on approved shop drawings. Backer material shall be of appropriate size and shape and shall be compressed between 25% and 50% when installed.
 - 3) Backer material may not be modified in-lieu of using the properly dimensioned material. Install, when required a polyethylene, or other approved, bond backer tape to provide sealant bead profiles as detailed on approved shop drawings.
- f. Do not allow sealants, primers, or other compounds to overflow, spill or migrate into voids of adjacent construction.
- g. Remove excess sealant spillage promptly as this work progresses. Clean adjacent surfaces by recommended means to remove sealant, but not damage the surfaces. Remove all cartons and debris from the site as the work progresses and at the end of each work day. Joints shall be prepared and sealed on the same working day.

SEALANTS 2123

- h. Tooling of Non-sag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
 - 1) Provide concave joint configuration per Figure 5A in ASTM C 1193 "Standard Guide for Use of Joint Sealants," unless otherwise indicated.
 - 2) Provide flush joint configuration, per Figure 5B in ASTM C 1193 "Standard Guide for Use of Joint Sealants," where indicated.
 - a) Use masking tape to protect adjacent surfaces of recessed and tooled joints.
 - 3) Provide recessed joint configuration, per Figure 5C in ASTM C 1193 "Standard Guide for Use of Joint Sealants," of recess depth and at locations indicated.
- i. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, and to comply with sealant manufacturer's written directions for installation methods, materials, and tools that produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in conformance with sealant manufacturer's written recommendations.
- j. Acoustical Sealant Applications:
 - 1) Provide acoustical sealant to form an airtight seal at all penetrations and perimeter of sound-rated partitions, floors and ceilings. Comply with requirements of specification section titled Gypsum Board. Use backer-rod where gaps to be sealed exceed 3/8 inches.
 - 2) Provide sheet caulking to seal the back and sides of all junction boxes (4 gang and smaller) recessed in acoustically-rated partitions.
 - 3) Provide acoustical sealant as a continuous bead along gypsum board face layer at all head and sill conditions of sound-rated partitions and around the perimeter of resilient ceilings.
- k. Firestop Sealants: In accordance with applicable UL Classified numbers compatible with products provided.

3.4 CLEANING

- A. Clean in accordance with Specification PROJECT CLOSEOUT.
 - 1. Clean any soiled surfaces immediately.
 - Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated sealants immediately so that and installations with repaired areas are indistinguishable from original work.

SEALANTS 2123

3.6 SCHEDULES

- A. Sealant Schedule:
- B. Sealants: Description of joint construction and location where sealant is typically applied
 - 1. One-Part Neutral Cure Silicone Sealant:
 - a. Exterior and interior joints in vertical surfaces of concrete and masonry.
 - b. Between concrete masonry and stone.
 - c. Between metal and concrete, mortar, and stone.
 - d. Interior and exterior perimeter joints of metal frames in exterior walls.
 - e. Exterior overhead joints.
 - f. Use the applicable sealant for continual immersion in water applications, such as swimming pools, fountains and cooling towers USDA Approved.
 - 2. One-Part Acid-Curing Silicone Sealant:
 - a. Exposed joints within glazed curtain wall framing systems, skylight framing systems, and aluminum entrance framing systems, if applicable.
 - 3. One-Part Mildew-Resistant Silicone Sealant:
 - a. White Grout Joints: Provide white silicone sealant material to match adjacent white grout joints in interior joints in vertical surfaces of ceramic tile in toilet rooms, showers, and kitchens.
 - b. Colored Grout Joints: Provide colored silicone sealant material to match adjacent colored grout joints in interior joints in vertical surfaces of ceramic tile in toilet rooms, showers, and kitchens.
 - 4. One-Part Gun Grade Urethane Sealant:
 - a. Exposed joints in pre-cast, masonry, window frame perimeters and similar types of construction joints.
 - 5. Multi-Component Gun Grade Urethane Sealant:
 - a. Control joints and window and door perimeters.
 - 6. Multi-Component Gun Grade Urethane Sealant (Fast Curing):
 - a. Plaza Decks.
 - 7. One-Part or Multi-Component Gun Grade Urethane Sealant (Security Sealant):
 - a. Control joints and window and door perimeters where sealant is exposed to physical abuse.
 - 8. One-Part Pourable Self-Leveling Urethane Sealant:
 - a. Exterior and interior joints in horizontal surfaces of concrete.
 - b. Exterior and interior joints in horizontal surfaces between metal and concrete, mortar, stone, and masonry surfaces.
 - 9. Multi-Component Pourable Self-Leveling Urethane Sealant (Fast Curing):
 - a. For use when walking surfaces require use within 24 hours of application without damage to joint surfaces.
 - b. Exterior and interior joints in horizontal surfaces of concrete.
 - 10. Acrylic-Emulsion Sealant:
 - a. Paintable joints for the following surfaces expected to receive field painting:
 - 1) Interior joints in vertical and overhead surfaces at perimeter of elevator door frames and door frames (not requiring security grade sealant).
 - 2) Interior joints in gypsum board, plaster, concrete, and concrete masonry.
 - 3) All other interior field paintable joints not indicated otherwise.
 - 11. One-Part Butyl Sealant:
 - a. Primarily used for glazing seals where little or no movement is expected.
 - 12. Acoustical Sealant:

SEALANTS 2123

a. Joints to control dust, air, smoke and sound transmission, including under all exterior wall sill plates placed on top of Cast-In-Place Concrete slabs.

13. Firestop Sealants:

a. In fire-rated walls, compatible with wall ratings and in accordance with applicable penetration types in walls and floors, and in accordance with UL Classified numbers.

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 081100 - METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - Provide all material, labor, equipment and services necessary to fabricate and install all Custom Metal Doors and Custom Metal Frames materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - Fire-Rated and Smoke-Rated Assemblies.
 - 2. Provide all material, labor, equipment and services necessary to fabricate and install Temperature Rise Fire-Rated Assemblies.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 15 14 DRILLED ANCHORS
 - 4. 03 30 00 CAST-IN-PLACE CONCRETE
 - 5. 05 12 00 STEEL AND FABRICATIONS
 - 6. 06 10 00 ROUGH CARPENTRY
 - 7. 07 60 00 SHEET METAL
 - 8. 07 92 00 SEALANTS
 - 9. 08 33 00 COILING DOORS
 - 10. 08 70 00 HARDWARE
 - 11. 08 80 00 GLASS
 - 12. 09 24 00 CEMENT PLASTER
 - 13. 09 29 00 GYPSUM BOARD
 - 14. 09 30 00 TILE
 - 15. 09 67 23 RESINOUS FLOORING
 - 16. 09 72 00 WALL COVERINGS
 - 17. 09 91 00 PAINTING
 - 18. 10 05 00 MISCELLANEOUS SPECIALTIES
 - 19. 10 14 00 IDENTIFYING DEVICES
 - 20. DIVISION 13 SPECIAL CONSTRUCTION
 - 21. DIVISION 14 CONVEYING EQUIPMENT
 - 22. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICE SUBGROUP.

1.2 REFERENCES

A. Standards:

- 1. In accordance with the following standards:
 - a. ANSI American National Standards Institute
 - b. ASTM American Society of Testing and Materials
 - c. AWS American Welding Society
 - d. HMMA Hollow Metal Manufacturers Association (Division of NAAMM)
 - e. NAAMM National Association of Architectural Metal Manufacturers
 - f. NFPA National Fire Protection Association
 - g. NILECJ National Institute of Law Enforcement and Criminal Justice
 - h. UL Underwriter's Laboratory, Inc.

- i. USSG U.S. Standard Gages
- j. WH Warnock Hersey International

1.3 DEFINITIONS

- A. Minimum Thickness: Base metal thickness without coatings.
- B. Custom Hollow Metal Work: Hollow metal work fabricated according to ANSI / NAAMM-HMMA.
- C. Glazing Molding: Portion of the assembly retaining glazing materials or in-fill panels in a hollow metal door which contain the integral glazing stop, or to which a glazing stop is attached.
- D. Glazing Stop: A formed metal section used to secure glazing in a door or frame.
- E. Prepared Opening: Existing opening or wall constructed prior to installation of frames.

1.4 SYSTEM DESCRIPTION

A. Design Requirements:

- Metal Doors and Metal Frames Assemblies.
 - All Doors shall be custom in accordance to NAAMM-HMMA Standards for Hollow Metal Doors.
 - b. All Frames shall be custom in accordance to NAAMM-HMMA Standards for Hollow Metal Frames.

2. Fire Rated Assemblies:

- a. Doors and Frames Assemblies shall be custom in accordance to NAAMM-HMMA Standards for Fire-Rated Hollow Metal Doors and Frames and shall comply with all of the requirements for Doors and Frames.
- b. Conform to the requirements of CBC, Chapter 7 "Fire and Smoke Protection Features".
 - Fire-Rated Door Assemblies shall comply with NFPA 252 "Standard Methods of Fire Tests of Door Assemblies" and UL 10C "Positive Pressure Fire Tests for Door Assemblies."
 - 2) Fire-Rated Window Assemblies shall comply with NFPA 257 "Fire Testes for Fire Window Assemblies and Glass Block Assemblies," NFPA 80 "Standard for Fire Doors and Other Opening Protectives," and UL 9 "Fire Tests of Window Assemblies."
 - 3) Fire-Rated Door Assemblies shall also meet the requirements for a Smoke and Draft Control Door Assembly, complying with UL 1784 "Air Leakage Tests for Door Assemblies."
 - 4) Fire-Rated Doors, Panels, and Frames shall be labeled by an DSA/FLSapproved agency and shall comply with NFPA 80 "Standard for Fire Doors and Other Opening Protectives" and UL 1784 "Air Leakage Test for Door Assemblies."
- c. All Fire-Rated Doors are to be positive latching and self or automatic closing in accordance with NFPA 80 "Standard for Fire Doors and Other Opening Protectives."
- d. All Fire-Rated Assemblies shall be provided with approved gasketing material, so installed as to provide a seal where the door meets the stop on both sides and across the top.

1) Continuous Hinges, Seals, etc. shall not obscure ratings of doors or door frames.

1.5 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES.
 - 1. Contractor shall check all drawings and verify all dimensions (including wall thickness) in the field prior to fabrication.
 - 2. Contractor shall verify that shop drawings include all required materials and material clearances.

B. Product Data:

- 1. Include construction details, material descriptions, core descriptions, label compliance, fire-resistance ratings, temperature-rise ratings, and finishes for each type of product indicated.
 - a. Provide information indicating all the Structural Properties of the steel materials.

C. Shop Drawings:

- 1. Include, but not limited to, the following information:
 - a. Elevations of each door design and frame configuration.
 - b. Details of doors, including vertical and horizontal edge details.
 - c. Frame details for each frame type, including dimensioned profiles.
 - d. Details and location of reinforcement and preparations for hardware.
 - e. Details of each different wall opening condition.
 - f. Details of anchorages, joints, field splices, and connection.
 - g. Details of accessories.
 - h. Details of moldings, removable stops, and glazing.
 - i. Details of louvers, including sizes and location in doors, where required.
 - j. Details of conduit and preparations for power, signal, and control systems.
- 2. Provide a Schedule, prepared by or under the supervision of supplier for doors, panels, and frames using same reference numbers for details and openings as those on the Drawings.
 - a. Coordinate with door hardware schedule.
- 3. Provide setting drawings, templates, and directions for installing anchorage, including sleeves, concrete inserts, anchors, bolts, and items with integral anchors for installation coordination.
- 4. Manufacturer's printed instructions for preparation, installation and care requirements for installers and inspecting authorities.

D. Samples:

- 1. When factory applied color is indicated, provide manufacturer's full range of factory applied color finishes for selection.
- 2. Provide typical frame joint section and sample showing typical edge condition specified.
- 3. When Stainless Steel is indicated, provide samples of 3 inches by 5 inches for each type of exposed finish required.
 - a. Frames: Provide fabrication samples of profile and corner joints.
 - b. Doors: Provide fabrication sample of corner showing vertical edges and top.

E. Quality Assurance/Control Submittals:

- 1. Design Data:
- 2. Test Reports:

- a. Product Test Reports based on evaluation of comprehensive test performed by a qualified testing agency, for each type of fire-rated metal door, panel, and frame assembly.
- b. Water Tightness Test Reports.
- 3. Certificates:
 - a. Oversized Construction Certification.
 - b. Installer Certification for Temperature Rise Fire Rated Framing System.
- F. Closeout Submittals in accordance with the following:
 - 1. General Construction Warranty.
 - 2. Workmanship and Materials Warranty.

1.6 QUALITY ASSURANCE

A. Qualifications:

- 1. Material Qualifications:
 - a. Fire-Rated Doors, Panels, and Frames Assemblies shall be labeled by an DSA/FLS approved agency and shall comply with NFPA 80 "Standard for Fire Doors and Other Opening Protectives" and UL 1784 "Air Leakage Test for Door Assemblies."
 - b. Oversized Door Assemblies required to be fire rated and exceeds the limitations of labeled assemblies, a certificate of inspection shall be furnished by an approved testing agency in lieu of an Oversized Fire Door Label.
- 2. Installer Qualifications:
 - a. Installer shall be experienced and shall have-successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - b. Installer(s) shall have participated in mock-up installation that was successfully tested for water tightness.
- 3. Manufacturer/Supplier Qualifications:
 - a. Manufacturer/Supplier shall have successfully produced/supplied products similar to that required for this Project, and shall have sufficient production/supply capacity to produce/supply required units without causing delay in the work.
 - b. Manufacturers must be members of the HMMA, who have been engaged for at least two years in the production for sale of swing steel doors and frames on a national basis.
 - 1) All doors, panels and frames shall be manufactured and supplied by the same manufacturer.

B. Regulatory Requirements:

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

C. Mock Ups:

- 1. Provide Mock-Ups prior to application of the final layer of the finished exterior wall material and prior to installation of any exterior wall cavity and interior materials.
- 2. Metal Frame Assembly:
 - a. Mock-Ups shall be of each type of opening assembly in every type of exterior wall assembly in which an opening occurs, shall integrate all other related work assemblies and shall be representative of the intended end use configuration.

- 1) Provide a Mock-Up with a minimum opening size of 24 inches square for window opening.
- b. Mock Ups will be used for establishing construction sequence, and installation requirements of materials, and creating water tight assemblies.
- c. Mock-Ups may become part of the completed Work upon successful testing for water tightness.

3. Installation:

- a. The Project Inspector, the Architect, Contractor's Superintendent and Sub-contactor's Superintendent shall observe the installation of materials.
- b. Installation crew for the Mock-Ups shall be the installers of the metal frame systems for this project and installers, as necessary, of other related work assemblies.
- c. Mock Ups shall include the installation of integral flashing, glazing, louvers, sheet metal flashing, sealants, water barriers and penetration flashing of exterior material systems and other materials of related work that makes the openings watertight.
- d. Failed Mock Ups shall be removed and the assembly reinstalled until the water tightness test is successful.

D. Meetings:

- 1. Pre-Installation: Scheduled by Contractor prior to the start of work.
 - a. Coordinate the work with all other related work.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Establish protection procedures to maintain installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 - 1. Doors, Panels, and Frames shall be palletized, wrapped, or crated to provide protection during transit and Project-Site storage. Do not use non-vented plastic.
 - a. Provide additional protection to prevent dents, scratches and other damage.

B. Acceptance at Site:

- 1. Do not deliver doors, panels, and frames to project site until Installer is ready and the site conditions will accommodate the installation of frames.
- 2. Damaged products will not be accepted.

C. Storage and Protection:

- 1. Storage and protection shall be in accordance with NAAMM-HMMA 840 Standard, "Installation and Storage of Hollow Metal Doors and Frames."
- 2. Store Doors, Panels, and Frames under cover at Project Site. Stored on level platforms, minimum six (6) inches above ground, allowing air circulation under stacked units.
 - a. Doors, Panels, and Frames shall be placed in the up-right position, spaced by blocking to allow ventilation between units.

b. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.8 PROJECT CONDITIONS

A. Existing Conditions:

- Examine site and compare it with the drawings and specifications. Thoroughly
 investigate and verify conditions under which the work is to be performed. No
 allowance will be made for extra work resulting from negligence or failure to be
 acquainted with all available information concerning conditions necessary to estimate the
 difficulty or cost of the work.
- 2. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - a. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions for the fabrication of custom frames. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.9 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. Doors and Frames in accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
 - 2. Provide the Temperature Rise Rated Framing system warranty against defective workmanship and materials.
 - a. Warranty Period Five (5) years upon project completion and acceptance.

C. Installer's Warranty:

- 1. Issue to the Owner a warranty against defective workmanship and materials.
 - a. Warranty period Four (4) Years.
 - b. In accordance with the terms of the Specification Section WARRANTIES.
 - c. Warranty shall include the responsibility for the repairs of any failure that is the result of defects in materials and workmanship.
 - d. Warranty shall certify that the installation of all exterior Metal Doors and Frames were done in accordance with the method and procedures established with the successful Mock-Up for water tightness.
 - e. The Warranty shall be co-endorsed by the General Contractor, the Metal Door and Frame Material Manufacturer, the Metal Door and Frame Installer and Glazing Installer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Custom Metal Doors, and Frames:
 - a. SECURITY METAL PRODUCTS CORPORATION.
 - b. Acceptable alternative manufacturers:
 - 1) CURRIES COMPANY.
 - 2) METAL MANUFACTURING CO., INC.
 - 3) STILES CUSTOM METAL, INC.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: Commercial Steel (CS), Type B, conforming with ASTM A 1008/A 1008M "Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable." Steel shall be suitable for exposed to view applications.
- B. Hot-Rolled Steel Sheet: Commercial Steel (CS), Type B, conforming with ASTM A 1011/A 1011M "Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength." The steel shall be pickled and oiled, free of scale, pitting, coil-breaks or other surface defects.
- C. Metallic-Coated Steel Sheet: Commercial Steel (CS), Type B, complying with ASTM A 653/A 653M "Standard Specifications for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process." The steel shall have a -minimum G60 (Z180) zinc (galvanized) or A60 (ZF 180) zinc-iron-alloy (galvannealed) coating designation.
- D. Inserts, Bolts and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M "Standard Specification for Zinc Coating (Hot-dip) on Iron and Steel Hardware."
- E. Grout:
 - Concrete Walls: Comply with ASTM C476 "Standard Specification for Grout for Masonry," with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M "Standard Test Method for Slump of Hydraulic-Cement Concrete."
 - 2. Masonry Walls: Mortar comply with Specification Section CONCRETE MASONRY UNITS.
- F. Insulation:

- 1. Mineral-Fiber Insulation: ASTM C 665 "Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing," Type I (blankets without membrane facing): consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density: with maximum flame-spread and smoke-developed indexes of 25 and 50 respectively; passing ASTM E 136 "Test method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C," for combustion characteristics.
 - a. Fire Rated Doors and Frames: Provide insulation that provides fire protection.
- 2. Expanded Foam Insulation suitable for injection into frame cavity.
 - a. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
- 3. Exterior Doors: Provide core with thermal polyisocyanurate insulation cores.
- 4. Exterior Door Frames: Solidly packed mineral insulation.
- 5. Insulation for Miscellaneous work:
 - a. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
- G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type non-corrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- H. Sealants: Comply with Specification Section SEALANTS.
 - 1. Sealants shall be compatible with glazing and frames.

2.3 MANUFACTURED UNITS

A. General:

- 1. Exterior Doors, and Frames: In accordance with NAAMM-HMMA Standard 862, "Guide Specifications for Commercial Security Hollow Metal Doors and Frames," Class IV Door in accordance with NILECJ-STD-0306.00.
- 2. Interior Doors, and Frames: In accordance with NAAMM-HMMA 861 Standard, "Guide Specifications for Commercial Hollow Metal Doors and Frames," unless otherwise indicated in the Contract Documents.

B. Doors:

- 1. Design shall be custom seamless hollow construction in the flush type variations as indicated.
 - a. Thickness 1-3/4 inch.
- 2. Face Sheets:
 - a. Exterior Doors shall be fabricated from Metallic-Coated Steel Sheets with zinc-iron-alloy (galvannealed) coating designation.
 - 1) Exterior Doors 14 gage minimum.
 - b. Interior Doors shall be fabricated from Cold-Rolled Steel Sheets.
 - 1) Interior Doors 18 gage minimum.
- 3. Core:
 - a. Steel Stiffened with continuous vertical formed steel sections fabricated from same materials as face sheets.
 - 1) Exterior Door 18 gage minimum.
 - 2) Interior Door 22 gage minimum.
 - b. Spaces between stiffeners shall be insulated the full height of the door.
- 4. Top and Bottom Edges:
 - a. Close with continuous recessed and flush filler channels fabricated from same material as face sheets.

- 1) Exterior Door 12 gage minimum.
- 2) Interior Door 16 gage minimum.
- b. All doors shall have an additional flush filler channel at top and flush filler channel at bottom edges, unless recess channel at bottom is required for hardware.
- c. All channels shall be fabricated from same material as face sheets.
- 5. Jamb Edges:
 - a. Reinforce with continuous "U" channels fabricated from same material as face sheets.
 - 1) Exterior Door 12 gage minimum.
 - 2) Interior Door 16 gage minimum.
 - b. All channels shall be galvanized at exterior doors.
 - c. Astragals shall be fabricated from same material as face sheets. 14-gage minimum
- 6. Hardware Reinforcements:
 - a. Exterior Doors: Reinforcing Plates shall be fabricated from the same material as the face sheets in the minimum thickness as follows:
 - 1) Hinges and Pivots 1/4" plate.
 - 2) Continuous hinges 14-gage.
 - 3) Mortise Hardware 7-gage.
 - 4) Locks, Exit Devices, Flush Bolts, Concealed Holders, Concealed Hardware or Surface-Mounted Closures 12-gage.
 - 5) Pull Plates, Bars and all other Surface-Mounted Hardware 12-gage.
 - b. Interior Doors: Reinforcing Plates shall be fabricated from the same material as the face sheets in the minimum thickness as follows:
 - 1) Hinges and Pivots 7-gage.
 - 2) Continuous Hinges 14-gage.
 - 3) Mortise Hardware 10-gage.
 - 4) Locks, Exit Devices, Flush Bolts, Concealed Holders, Concealed Hardware or Surface-Mounted Closures 12-gage.
 - 5) Pull Plates, Bars and all other Surface-Mounted Hardware 16-gage.
- 7. Glazing Moldings and Stops:
 - a. Fabricate from the same material as the door face sheets.
 - 1) Exterior Doors 16-gage minimum.
 - 2) Interior Doors 20-gage minimum.

C. Frames:

- 1. Design shall be custom seamless hollow construction in the variety of configurations as indicated.
- 2. Exterior Frames shall be fabricated from Metallic-Coated Steel Sheets with zinc-iron-alloy (galvannealed) coating designation.
 - a. All Opening sizes 12-gage minimum.
- 3. Interior Frames shall be fabricated from Cold-Rolled Steel Sheets.
 - a. Openings 4'-0" or less 16-gage minimum.
 - b. Openings greater than 4'-0" 14-gage minimum.
- 4. Glazing Stops shall be fabricate from the same material as Frames.
 - a. Exterior Frames 16-gage minimum.
 - b. Interior Frames 20-gage minimum.
- 5. Internal Frame Stiffeners shall be fabricated from the same material as Frames.
 - a. Head of Frames 12-gage.
- 6. Internal Reinforcing Tabs shall be fabricate from the same material and gage thickness as Frame.
- 7. Hardware Reinforcements:

- Exterior Frames: Reinforcing Plates shall be fabricated from the same material as a. the Frame in the minimum thickness as follows:
 - 1) Hinges and Pivots 1/4" plate full width of frame x 10".
 - 2) Continuous Hinges 14-gage full width of frame x entire frame length.
 - 3) Strike Hardware 7-gage.
 - 4) Flush Bolts 7-gage.
 - 5) Closers 7-gage.
 - 6) Surface-Mounted Hardware 7-gage.
 - Hold-Open Arms 7-gage. 7)
 - Surface Panic Devices 7-gage.
- Interior Frames: Reinforcing Plates shall be fabricated from the same material as b. the Frame in the minimum thickness as follows:
 - Hinges and Pivots 7-gage full width of frame x 10". 1)
 - 2) Continuous Hinges 14-gage full width of frame x entire frame length.
 - 3) Strike Hardware 12-gage.
 - 4) Flush Bolts 12-gage.
 - Closers 12-gage. 5)
 - 6) Surface-Mounted Hardware 12-gage.
 - 7) Hold-Open Arms 12-gage.
 - Surface Panic Devices 8) 12-gage.
- 8. Grout Guards: Grout Guards shall be fabricated from the same material as the Frame in minimum 22-gage thickness.

Frame Anchors: D.

- Exterior Frames: Frame Anchors shall be fabricated from Metallic-Coated Steel Sheets, 1. unless indicated otherwise.
 - not less that 2" wide x 10" long Anchors. Masonry Wall
 - 14 gage T-Strap Anchors. 1) Non Grouted Frames
 - 2) 14-gage perforated Adjustable Strap & Stirrup Anchors. **Grouted Frames**
 - Wire Loop Anchors of 0.156" diameter steel wire may be used at non-fire-rated frames that are fully grouted.
 - 14-gage Pour In Place Anchors. Concrete Walls h.
 - Stud Frame Walls 16-gage Combination Wood/Steel Stud Anchors. c.
 - Anchor shall be not less than 2" wide x 10" long. 1)
 - 14-gage Fixed Floor Anchors. d. Jamb Base
 - Floor Base 14-gage Existing Wall Anchors. e.
 - 14 gage continuous Rough Buck Anchors. Where indicated
 - f. **Prepared Openings** 14-gage Existing Wall Anchors.
 - 14 gage continuous Rough Buck Anchors. Where indicated
- 2. Interior Frames: Frame Anchors shall be fabricated from Cold-Rolled Steel Sheets or Hot-Rolled Steel Sheets, unless indicated otherwise.
 - Masonry Wall not less that 2" wide x 10" long Anchors.
 - Non Grouted Frames 16 gage T-Strap Anchors. 1)
 - 2) **Grouted Frames** 16 gage perforated Adjustable Strap & Stirrup Anchors.
 - Wire Loop Anchors of 0.156" diameter steel wire may be used at non-fire-rated frames that are fully grouted.
 - Concrete Walls 16 gage Pour In Place Anchors. b.
 - Wood Stud Frame Walls 18 gage Wood Stud Anchors. c.
 - Anchor shall be not less than 2" wide x 10" long. 1)
 - Metal Stud Frame Walls 18-gage Metal Channel Stud Anchors. d.
 - 14-gage Fixed or Adjustable Floor Anchors. e. f. Floor Base 16 gage Existing Wall Anchors.
 - Where indicated 16 gage Fixed Mullion Anchors. 1)

Jamb Base

- g. Prepared Openings 16-gage Existing Wall Anchors.
 - 1) Where indicated 16 gage continuous Rough Buck Anchors.

E. Fasteners:

- 1. Screws, bolts, washers, shields, spacers and other similar fastening devices:
 - a. Provide stainless steel vandal resistant screws when outside exterior face glass stops are indicated.
 - b. Furnish and install as required by frame installer.
 - c. Provide Stainless Steel fasteners at Stainless Steel Frames.

2.4 FABRICATION

A. Shop Assembly:

- 1. General:
 - a. Fabricate in accordance NAAMM-HMMA Standard 810 "Hollow Metal Doors" and NAAMM-HMMA Standard 820 "Hollow Metal Frames," and NAAM-HMMA Standard 850 "Fire-Rated Hollow Metal Doors and Frames."
 - b. Fabricate to the required size and profiles by accurately forming, welding edges straight, sharp and true. Corner bends shall be true and straight and of minimum radius for the gage of metal used.
 - c. All finish work shall be strong, rigid and neat in appearance with corners, hairline joints and surfaces free from warp, wave, buckle, tool marks, surface imperfections or other defects.
 - d. Welding to conform to applicable standards of AWS for high grade finished metal fabrication. All exposed welds shall be ground, filled and dressed smooth with no voids, tool marks, surface imperfections or ridges showing to make them invisible and provide a smooth flush surface.
 - e. Assemblies shall be shop fabricated and permanently assembled before shipment.
 - Where shipping limitations so dictate, frames for large openings shall be fabricated and prepared in section designated for assembly in the field and clearly identified.

2. Metal Door Fabrication:

- a. General: All doors shall be of the types and sizes required and shall be fully welded seamless construction with smooth surfaces without visible joints of seams on exposed faces or edges.
 - 1) Glazed Lites shall be factory cut openings in doors.
 - 2) Provide weep-hole openings in the bottom of exterior doors to permit the escape of entrapped moisture.
- b. Face Sheets: Door faces shall be joined at their vertical edges by a continuous weld extending the full height of the door.
- c. Core: Stiffeners shall extending full-door height and spanning the full thickness of the interior space between door faces.
 - 1) Space Stiffeners no more than 6" apart and securely attached to both face sheets by spot welds spaced a maximum of 5" o.c..
 - 2) Solidly pack cavities the entire height of door with mineral-fiber insulation.
 - a) Fire Door Cores: As required to provide fire-protection as indicated.
- d. Top and Bottom Edges: Closing Channels shall extend the full width of the door at top and bottom edges.
 - 1) All doors shall have recessed Closing Channels, spot welded to both faces. When left exposed, fill all gaps with epoxy sealer and filler, sand smooth with no tool marks or surface imperfections.

- 2) All doors shall have flush-filler Closing Channels in addition to recessed Closing Channels. Channels shall be continuously welded and ground smooth with no marks at all doors.
 - a) Flush-filler Closing Channel shall be omitted at bottom edge when recess channel is required for hardware.
- e. Jamb Edges: Reinforcing Channels shall extend the full height of the door.
 - 1) Edge profiles shall be provided on both vertical edges of doors as follows:
 - a) Single-Acting Swing Doors beveled 1/8" in 2".
 - b) Double-Acting Swing Doors rounded on 2-1/8" radius.
 - 2) Astragal: Flat x 1-1/2 inch, continuous welded to panel, ground smooth with no tool marks or surface imperfections. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
 - a) Provide overlapping astragal on one leaf of pairs of doors where required for fire-performance rating or where indicated.
 - b) At exterior doors, provide overlapping astragal at strike. Cope astragal around strike plate.
- f. Hardware Reinforcements: Doors shall be mortised, reinforced, drilled and tapped at the factory for fully templated hardware only, in accordance with the approved hardware schedule and templates provided by the hardware contractor.
 - 1) Where surface-mounted hardware is to be applied, doors shall have reinforcing plates only under the face of door.
- g. Glazing Moldings and Stops: Provide glazing moldings and stops to secure glazing material and louvers. Moldings and stops shall be flush with face sheets of door. Use the same trim profile on all Fire-Rated and Non Fire-Rated Openings.
 - 1) Fixed Glazing Moldings shall be securely welded to both face sheets of door.
 - 2) Removable Glazing Stops shall be channel shaped and have mitered hairline corner joints. Drill and dimple stop for countersinking and concealment of fasteners spaces equally at 9" o.c. maximum and a maximum of 2" from ends. Snap-on attachments will not be permitted.
 - 3) Metal surfaces underneath the glazing stops and the inside of the glazing stops shall be treated for maximum paint adhesion and painted with a with a rust inhibitive primer prior to installation in the door.
 - 4) Coordinate depth and rabbet width between fixed and removable stops with type of glazing and type of installation indicated.
- 3. Metal Frame Fabrication:
 - a. General: All frames shall be welded units of the sizes and profiles indicated and shall be of seamless hollow construction with smooth surfaces without visible joints of seams on exposed faces or edges.
 - 1) Metal Frame Spreaders shall be temporarily attached at bottom of all open frames for shipping and storage.
 - b. Frame Sections: All frames are to be rolled and brake formed with integral nailing flanges, back bends, faces, rabbits, stops, and soffits, unless indicated otherwise.
 - Provide 3 ½ inch wide integral Nailing Flanges at exterior frames. The flange shall be continuous all around the frame at head, jambs and wall sills without gaps at the corner joints. Coordinate flange length with height of concrete curb.
 - 2) Punch and Dimple frames at attachment points for countersinking and concealment of all through the frame anchorage fasteners.
 - c. Frame Joints:

- 1) Perimeter Corners: Head, Jamb and Wall Sills Members shall be saw-mitered and fully (continuously) welded along entire joint from the throat or the unexposed side at Flanges, Returns, Faces, Rabbet, Stops, and Soffits.
- 2) Perimeter Butts: Entire joint shall be fully (continuously) welded along entire joint at Flanges, Returns, Faces, Rabbet, Stops, and Soffits from the throat or the unexposed side of the frame.
 - a) Interior Frames: Continuously weld only the Faces. Rabbits, Stops and Soffits shall to be tightly fitted and appear as a hairline seams.
 - b) Vertical Mullions members shall extend through Floor Sill Members to floor. Floor Sill Members Stops are to be notched.
- 3) Internal Flush and Indented Butts: Vertical Mullions Members shall be continuous, butt to Head and Sill Members and extend through Horizontal Rail Members. Vertical Mullion Stops are to be notched at Head and Sill Members and the Horizontal Rail Stops are to be notched to Vertical Member. Continuously weld only the Faces.
 - a) Exterior Frames: Body Putty continuously along entire joint at returns, rabbets, stops, and soffits creating a water tight joint. Sand flush and smooth with no voids or ridges.
 - b) Interior Frames: Rabbits, Stops and Soffits shall to be tightly fitted and appear as a hairline seams.
- d. Alignment and Reinforcing Tabs: Provide internal alignment and reinforcing tabs at each joint of field splices with a minimum overlap of 2".
- e. Internal Frame Stiffeners: Provide additional continuous steel "U" Channel extending the full width of frame and shall be factory welded into head of frame.
 - 1) Grouted Frames with openings greater than 4'-0" width.
 - 2) Frames with openings greater than 12'-0" in width.
- f. Hardware Reinforcements: Frame shall be mortised, reinforced, drilled and tapped at the factory for fully templated hardware only, in accordance with the approved hardware schedule and templates provided by the hardware contractor.
 - 1) Where surface-mounted hardware is to be applied, frames shall have reinforcing plates only under face of frame.
- g. Grout Guards: Provide at all hardware preparations, tapped mounting holes, glazing stop screws, silencers, and electrical box preparations on frames that are to be grouted.
 - 1) Weld guards to inside of frame at throat.
- h. Glazing Stops: Provide channel shaped removable Glazing Stops to secure glazing material or panels. Glazing Stops shall be continuous and have butted hairline corner joints.
 - 1) Coordinate stop depth and rabbit width between fixed and removable stops with type of glazing and type of installation indicated.
 - a) Stop Depth 5/8" depth minimum.
 - 2) Drill and Dimple stops for countersinking and concealment of fasteners uniformly spaced at 9 inches o.c. maximum and not more that 2 inches maximum from each corner.
 - 3) Metal surfaces underneath the glazing stops and the inside of the glazing stops shall be treated for maximum paint adhesion and painted with a with a rust inhibitive primer prior to installation in the door.
- 4. Frame Anchors:
 - a. Coordinate the type of frame anchors with the type of frame insulation or grout being used so that the frame is fully packed with no voids.
 - b. All Frame Anchors shall be securely welded to the throat at inside of frames.

- c. Frame Anchor Spacing: All Frame Anchors at head, jamb and sill shall be placed a maximum of 8" from frame corners, and ends, with the remainder of the anchors to be equally spaced, not to exceed a maximum of 24" o.c. for all walls types unless indicated otherwise.
 - 1) Masonry Walls: The spacing of anchors shall be equally spaced, not to exceed a maximum of 24" o.c.. Total number of anchors provided on each jamb shall be not less than the following:
 - a) Frames up to 7'-6" height 4 anchors.
 - b) Frames 7'-6" to 8'-0" height 5 anchors.
 - c) Frames over 8'-0" height provide five (5) anchors plus one (1) additional anchor for each 2' -0" or fraction thereof in height over 8'-0".
 - 2) Stud Framed Walls: The spacing of anchors shall be equal spaced, not to exceed a maximum of 18" o.c.. Total number of anchors provided on each jamb shall be not less than the following:
 - a) Frames up to 4'-0" height 4 anchors.
 - b) Frames 4'-0" to 7'-6" high 5 anchors.
 - c) Frames 7'-6" to 8'-0" height 6 anchors.
 - d) Frames over 8'-0" height provide six (6) anchors plus one (1) additional anchor for each 2'-0" or fraction thereof in height over 8'-0".
 - 3) Jamb Base: Provide floor anchors for each jamb and mullion that extends to floor.
 - a) When conditions do not permit the use of a floor anchor, an additional jamb anchor shall be substituted at a location not to exceed 8" from the base of the jamb.
 - 4) Floor Base: When conditions do not permit the use of Existing Wall Anchors at floor sill members, provide continuous rough buck for frame anchorage.
- 5. Rubber Door Silencers: Except on weather/sound strip or fire gasket doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single Swing Door Frames Provide and install three (3) at strike jamb.
 - b. Double Swing Door Frames Provide and install four (4) at head.

B. Fabrication Tolerances:

1. General: Clearances and Tolerances shall be in accordance with NAAMM-HMMA Standard 862 for Exterior Assemblies and NAAMM-HMMA Standard 861 for Interior Assemblies.

2.5 FINISHES

A. Shop Priming:

- After fabrication, all tool marks and surface imperfections shall be dressed, filled and sanded as required to make all faces and vertical edges smooth, level and free of all irregularities.
- 2. Clean and chemically treat (phosphatize) the metal to insure maximum paint adhesion in preparation for primer paint.
- 3. Apply rust-inhibitive primer paint to all surfaces, minimum dry thickness of 0.7 mils. Manufacturer to provide primer for prolonged exposure that are compatible with substrate and field-applied coatings.
 - a. Coordinate primer used with field-applied paint finishes that are indicated and specified.

- b. Shop Primer shall not be considered as a substitution for any primer required as part of the field-applied paint finishes.
- c. Rust-inhibitive primer shall be fully cured before packaging and shipment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions:

- Prior to the installation of the work under this specification section, examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work under this specification section.
- 2. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- 3. Report conditions detrimental to performance of the work under this specification section. Proceed with installation only after unsatisfactory conditions have been corrected.
- 4. Installation of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Protection:

1. Protect all adjacent surfaces from damage from work under this specification section.

B. Surface preparation:

- 1. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling and dressing, as required to repair area smooth, flush and invisible on exposed faces.
- 2. Prior to installation, All frames with temporary spreaders removed, shall be checked for size, and swing, and corrected to installation tolerance for squareness, alignment, twist and plumbness. Securely brace frames and maintain installation tolerances within the following limits.
 - a. Opening Width: Plus 1/16 inch, minus 1/32 inch, measured from rabbet to rabbet at top, middle and bottom of frame.
 - b. Opening Height: Plus 1/16 inch, minus 1/32 inch, measured measured vertically between the frame head rabbet and top of floor or bottom of frame minus jamb extension at each jamb and cross the head.
 - c. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - d. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - e. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines and perpendicular to plane of wall.
 - f. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- 3. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General:

- Install metal doors and frames plumb, rigid, properly aligned and securely fastened in place; comply with NAAMM-HMMA Standard 840, "Installation and Storage of Hollow Metal Doors and Frames."
- 2. Install in accordance with manufacturer's instructions and recommendations unless specifically noted otherwise.
- 3. Install Fire-Rated and Smoke-Control Assemblies in accordance with NFPA 80 "Standard for Fire Doors and Other Opening Protectives" and NFPA 105 "Standard for the Installation of Smoke Door Assemblies and Other Openings."

B. Frames:

- 1. Set frames accurately in position, plumbed, aligned, and temporarily braced secure, until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - b. 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.
 - 1) At exterior frames, Body Putty smooth entire joint continuously along returns, rabbets, stops, and soffits creating a watertight joint. Sand flush with no voids or ridges.
- 2. Solidly insulate within the throat of all non-grouted exterior and interior frames for the full depth, width and length of frame.
 - a. Provide fire-rated mineral fiber insulation as required to provide fire-protection and temperature-rise ratings as indicated at Fire Rated Assemblies.
 - b. Inject expanding foam insulation as required.
- 3. Jamb Base: Secure in place frame anchors to floor with post-installed expansion anchors.
- 4. Floor Base: Secure frames in place with post-installed expansion anchors to floor. Countersink fasteners, fill with body putty, sand smooth and flush with no voids or ridges. Conceal installed fasteners as to be invisible at exposed faces.
- 5. Masonry and Concrete Walls: Coordinate installation of frames to allow the solidly fill the space between frames and masonry or concrete with grout. Take precautions, grout in lifts and brace frames, to ensure that frames are not deformed or damaged by grout forces.
 - a. Field apply bituminous coating to backs of all frames that are filled with grout.
 - b. Install door silencers in frames before grouting.
- 6. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink fasteners, fill with body putty, sand smooth and flush with no voids or ridges. Conceal installed fasteners as to be invisible at exposed faces.
- 7. Stud Frame Walls: Secure frames in place with screw fasteners at frame anchors to wall framing.
- 8. In-Place Stud Frame Walls: Secure frames in place with screw fasteners at frame anchors to wall framing. Countersink fasteners, fill with body putty, sand smooth and flush with no voids or ridges. Conceal installed fasteners as to be invisible at exposed faces.

- 9. Frame and Wall Joints: Provide joint sealants to maintain watertight and airtight continuous seals that aesthetically join dissimilar materials without causing staining or deterioration of joint substrates. Application of sealants shall be in strict compliance with manufacturer's instructions.
 - a. Provide integral color sealants at exterior joints and paintable sealants at interior joints.
 - b. Clean out joint between frames and masonry or concrete to a depth of 3/4 inch. Fill with rod and sealants.
- 10. Field-apply compatible and paintable sealant at all frame joints that are exposed to the exterior for the full depth of the frame at returns, rabbits, stops and soffits.
- C. Doors: Fit doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Non-Fire-Rated Doors:
 - a. Between door and frame at jambs and head 3/16 inch maximum.
 - b. Between edges of pairs of doors 3/16 inch maximum.
 - c. Door Sill Clearances: Coordinate with threshold conditions and floor materials.
 - 1) Between bottom of door and top of threshold 3/8 inch maximum.
 - 2) Between bottom of door and floor with no threshold 3/4 inch maximum.
 - Fire-Rated and Smoke-Control Doors: Install doors with clearances according to NFPA 80 "Standard for Fire Doors and Other Opening Protectives" and NFPA 105 "Standard for the Installation of Smoke Door Assemblies and Other Openings."
 - a. Between bottom of door and floor covering surface 1/2 inch maximum.

D. Glazing Stops:

- 1. Coordinate and comply with installation requirements for all glazing indicated and specified.
- 2. Secure Glazing Stops to frames and doors with corrosion resistant countersunk flat or oval-head machine screws.
 - a. All exterior screws (head, jamb and sills) shall be attached with a bed of sealant at the penetration point into the frame for a positive seal against water intrusion.
 - b. Countersink fasteners, fill with body putty, sand smooth and flush with no voids or ridges. Conceal installed fasteners as to be invisible at exposed faces.
- 3. All exterior stops shall receive a full bed of sealant at back channel leg for the full length of opening, during final glazing installation for positive seal against water intrusion.
 - a. Coordinate sealants with the requirements of the glazing specified.

3.4 FIELD QUALITY CONTROL

A. Site Tests:

- 1. As required by Regulatory Requirements.
- 2. Mock-Up Assemblies:
 - a. Water Spray Test: Upon completion of the installation of the Mock-Up Assembly, conduct test for water penetration in according to AAMA 501.2 requirements.
 - 1) The Project Inspector, the Architect, Contractor's Superintendent and Sub-contractor's Superintendent shall visually inspect for water penetration.
 - 2) A Thermal Imagining process conducted by a Owner's Testing Laboratory Service, shall be used for additional inspection for water penetration.
 - 3) Cost of additional testing and inspection required due to failure for water tightness shall be borne by the Contractor.
 - b. Reports:

1) Project Inspector and/or Owner's Testing Laboratory Services shall provide a written report noting the installation and water tightness of the Mock-Up Assemblies tested.

B. Inspection:

- 1. Notification: Schedule all inspections. Notify the Architect, Project Inspector and any regulatory agencies of the time at least 48 hours prior to the inspection.
- 2. Regulatory Requirements: No work shall be excepted without the required inspections being performed.

3.5 ADJUSTING

- A. Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operation condition. Coordinate with hardware suppliers for function and use.
- B. Remove and replace defective work, including work that is warped, bowed, or other wise unacceptable.

3.6 CLEANING

- A. Clean in accordance with Specification Section TEMPORARY FACILITIES AND CONTROLS.
 - 1. Immediately clean all adjacent surfaces from all foreign materials.
 - 2. Immediately remove grout, sealants and any foreign materials from bonding to metal doors and frames.
 - 3. In accordance with manufacturer's instructions and recommendations.
- B. Metal Doors, and Frames finishes shall be clean and ready of application of any additional finishes after installation.
 - 1. Prime-Coat Surfaces: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
 - 2. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
 - 3. Stainless Steel Surfaces: Scratched and marred surfaces (including field welding) shall be cleaned and promptly be finished smooth. Refinish to match original finish.

3.7 PROTECTION

- A. Protect and maintain conditions that ensures the work is without damage or deterioration until the time of Completion has been executed.
 - 1. Maintain in a manner acceptable to manufacturer's and installer's warranty.

END OF SECTION

SECTION 083113 – ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all materials, labor, equipment and services necessary to furnish and install Equipment Access Doors, accessories and other related items necessary to complete Project as indicated by the Contract Documents unless specifically excluded.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 06 10 00 ROUGH CARPENTRY
 - 4. 08 11 00 METAL DOORS AND FRAMES
 - 5. 09 24 00 CEMENT PLASTER
 - 6. 09 29 00 GYPSUM BOARD
 - 7. 09 30 00 TILE
 - 8. 09 91 00 PAINTING
 - 9. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - a. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions
 - b. Submit manufacturer's standard color range for selection by the Architect.
 - 2. Shop Drawings.
 - a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Closeout Submittals in accordance with Specification Sections in Division One:
 - Maintenance Data in accordance with Specification Section PROJECT CLOSEOUT.
 - b. Operation Data in accordance with Specification Section PROJECT CLOSEOUT.
 - c. Project Record Documents in accordance with Specification Section PROJECT DOCUMENTS.
 - d. Warranty in accordance with Specification Section WARRANTIES.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

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

B. Regulatory Requirements:

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

C. Meetings:

- 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.4 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified product manufacturer:
 - a. MILCOR INCORPORATED, INC.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Access Doors:
 - 1. Design: Equal to Style AP, DW, AT, K or M Access Door as manufactured by MILCOR INCORPORATED, Lima, Ohio.
 - a. Design shall match material conditions present in each specific location.
 - b. In Cement Plaster locations, provide not less than 16 gage frames with a minimum of 24 gage expanded or perforated metal wings designed to finish flush with plaster.
 - 2. Size: Refer to Architectural, Plumbing, Mechanical, and Electrical Drawings.
 - 3. Material: Steel Frame and Door.
 - 4. Operation: Manual
 - 5. Lock: Key operated cylinder lock
 - 6. Finish: Shop Primed, unless otherwise noted.
 - a. In Shower, Toilet, or Locker Rooms all exposed portions shall be brushed stainless steel.
 - 7. Fire Rating: To match wall or ceiling assembly in which doors are located in accordance with Underwriters Laboratories ratings.
 - a. Continuous Hinges shall not obscure rating of doors and frames.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordination:
 - 1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
 - 2. Coordinate access doors with related items specified under other Sections to ensure proper and adequate interface of work. Particular attention is called to all Plumbing, Mechanical, and Electrical Specifications and drawings and the full cooperation required with that subcontractor's needs and work.

3.2 INSTALLATION

A. General:

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

END OF SECTION

SECTION 083300 - COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Coiling Doors, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - a. Types of Overhead Doors:
 - 1) Service Doors (and Non-Rated).
 - 2) Counter Shutters (Non-Insulated).
 - 3) Grilles (Non-rated).
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 30 00 CAST-IN-PLACE CONCRETE
 - 4. 05 12 00 STEEL AND FABRICATIONS
 - 5. 06 10 00 ROUGH CARPENTRY
 - 6. 08 11 00 METAL DOORS AND FRAMES
 - 7. 08 70 00 HARDWARE
 - 8. 09 24 00 CEMENT PLASTER
 - 9. 09 29 00 GYPSUM BOARD
 - 10. 09 91 00 PAINTING
 - 11. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

- 1. In accordance with the following standards:
 - a. FMG Factory Mutual Global.
 - b. ITS Intertek Testing Services.
 - c. NEMA National Electrical Manufacturers Association.
 - d. NFPA National Fire Protection Association.
 - Provide assemblies, when applicable, complying with NFPA 80 that are identical to door and frame assemblies tested for fire-response characteristics per UL 10b and NFPA 252, and that are listed and labeled for fire-ratings indicated by UL, FMG, ITS, or another testing and inspection agency acceptable to DSA/FLS.
 - 2) Provide certification by a testing agency acceptable to DSA/FLS that oversized fire-rated door assemblies, when applicable, comply with all standard construction requirements of tested and labeled fire-rated doors assemblies except for size.
 - 3) Provide electrical components, devices and accessories, when applicable, that are listed and labeled as defined in the CEC.
 - e. UL Underwriters Laboratories Inc.

1.3 DEFINITIONS

- A. The following definitions apply to the products of this Specification Section:
 - 1. Astragal: Weatherstripping attached to the Bottom Bar.
 - 2. Barrel: The assembly containing the counterbalancing springs of the unit.
 - 3. Between Jamb Mounted: Unit installed between the jambs of the opening.
 - 4. Bottom Bar: Bottom element of a coiling door or grille that rests on the sill or floor.
 - 5. Bracket: Plates at each end of the door that are bolted to the guides to support the barrel and curtain assembly.
 - 6. Curtain: The main body of the door that can be made up of slats, rods or links.
 - 7. End Locks: Metal pieces attached to the ends of the slats to prevent lateral shifting.
 - 8. Face Of Wall Mounted: Unit installed at the face of the jamb either inside or outside the structure.
 - 9. Guide: The side track of the door.
 - 10. Guide Weatherstrip: Vinyl or Neoprene material secured to the inside angle of the guide to prevent air infiltration.
 - 11. Hood: The sheet metal cover attached to the brackets to enclose the barrel assembly.
 - 12. Hood Baffle: A piece of waterproof canvas attached to the interior of the hood to prevent air infiltration.
 - 13. Inside Angle: Interior angle forming the channel in which the door goes up and down.
 - 14. Insulated Door: Door constructed with a double-slated curtain filled with insulation.
 - 15. Service Door: Large, slatted doors used to close large openings in industrial and commercial applications.
 - 16. Slat: Interlocking metal shapes that comprise the curtain of the door.
 - 17. Stop: Metal pieces attached to the guide to prevent the bottom bar from going up into the hood.
 - 18. Torsion Springs: Springs wound clockwise or counter clockwise position to counterbalance weight.
 - 19. Wall Angle: The angle of the door guide attached to the wall that supports the bracket.
 - 20. Windlocks: Metal pieces attached to the ends of the slats that interlock with the windlock bar in the guide to prevent the curtain from blowing out of the guides.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - a. Submit manufacturer's standard color range for selection by the Architect.
 - b. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
 - c. Include description of fire-release system including testing and resetting instructions.
 - 2. Shop Drawings.
 - a. Submit shop drawings prepared by, or under the supervision of a registered Civil or Structural Engineer in the State of California, detailing fabrication and assembly-as well as procedures and diagrams-- of the work under this section. Include setting drawings, templates, and directions for installation of anchor bolts and other anchorage to be installed as unit of work of other related sections.
 - b. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work.

- 1) Where installed products are indicated to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis that has been signed and stamped by a registered Civil or Structural Engineer in the State of California.
- c. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.
- 3. Quality Assurance/Control Submittals:
 - a. Manufacturer's Written Instructions.
 - b. Manufacturer's Field Reports.
 - c. Engineering Calculations.
 - 1) Submit engineering calculations computed and signed by a registered Civil or Structural Engineer in the State of California.
- 4. Closeout Submittals in accordance with the following:
 - Maintenance Data in accordance with Specification Section PROJECT CLOSEOUT.
 - b. Operation Data in accordance with Specification Section PROJECT CLOSEOUT.
 - c. Warranty in accordance with Specification Section WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:

- 1. Installer Qualifications:
 - a. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
- 2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- B. Regulatory Requirements:
 - 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

1.6 OWNER'S INSTRUCTIONS

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

1.7 WARRANTY

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

- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES:
 - a. Warranty period Five (5) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified Overhead Coiling Door and Grille products manufacturer, or approved equivalent:
 - a. CORNELL/COOKSON COMPANY.
 - b. Acceptable alternative manufacturers:
 - 1) OVERHEAD DOOR CORPORATION.
 - 2) WAYNE DALTON.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MANUFACTURED UNITS

- A. Counter Shutters:
 - 1. Door Curtain Materials and Construction:
 - a. Verify the size of this overhead door with the operation.
 - b. Door Curtains: Fabricate overhead coiling door curtain of interlocking slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
 - 1) Steel Curtain Slats (If applicable): Zinc-coated (galvanized), cold-rolled structural steel (SS) sheet; complying with ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron, Alloy-Coated (Galvanealed) by the Hot-Dip Process," G90 (Z275) coating designation.
 - a) Minimum Specified Thickness: Not less than 22 Gage (0.0299").
 - b) Flat profile slats.
 - 2) Stainless-Steel Curtain Slats (If applicable): ASTM A 666 "Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar," Type 304, #4 finish.
 - Minimum Specified Thickness: Not less than 20 Gage (0.0375").

- b) Flat profile slats.
- 3) Aluminum Curtain Slats (If applicable): ASTM B 209 "Specification for Aluminum and Aluminum-Alloy Sheet and Plate" or ASTM B 221 "Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes," alloy and temper recommended by aluminum producer and finisher for type of use with a mill finish.
 - a) Aluminum Extrusion Thickness: Not less than 16 Gage (0.050").
 - b) Flat profile slats.
- 4) Wood Curtain Slats: Interconnected select vertical grain solid stock.
- c. Curtain Insulation (If applicable): Fill slat with manufacturer's standard rigid cellular polystyrene or polyurethane-foam-type thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials." Provide an "R" Value of at least 6.29. Enclose insulation completely within metal slat faces.
 - 1) Inside Curtain Slat Face: To match material of outside metal curtain slat.

2. Endlocks:

- a. Service Door Endlocks and Windlocks: Malleable-iron casings galvanized after fabrication, secured to curtain slats with galvanized rivets or high-strength nylon. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.
- b. Counter Shutter Endlocks: Manufacturer's standard locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.

3. Bottom Bars:

- a. Service Door: Consisting of 2 angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; galvanized, stainless-steel, or aluminum extrusions to suit type of curtain slats.
 - 1) Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene; for placement between angles or fitted to shape, as a cushion bumper for interior door.
- b. Counter Shutters: Manufacturer's standard continuous channel or tubular shape, either stainless-steel or aluminum extrusions to suit type of curtain slats.
 - 1) Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene; for placement between angles or fitted to shape, as a cushion bumper for interior door.

4. Curtain Jamb Guides:

- a. Service Door: Fabricate curtain jamb guides of steel angles or channels and angles, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Build up units with not less than 3/16-inch thick galvanized steel sections complying with ASTM A 36 "Specification for Carbon Structural Steel" and ASTM A 123 "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products." Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding windlocks.
- Counter Shutter: Fabricate curtain jamb guides of angles or channels and angles of
 material and finish to match curtain slats, with sufficient depth and strength to
 retain curtain, to allow curtain to operate smoothly, and to withstand loading.
 Provide continuous integral wear strips to prevent metal-to-metal contact and to
 minimize operational noise; with removable stops on guides to prevent overtravel
 of curtain.

5. Seals:

a. Smoke Seals: Provide UL-listed and -tested smoke-seal perimeter gaskets when applicable.

- b. Weatherseals: Provide replaceable, adjustable, continuous, compressible weather-stripping gaskets fitted to bottom and top of all doors (to minimize sound of operation regardless of weatherstripping requirements). At door head, use 1/8-inch thick, replaceable, continuous sheet secured to inside of hood.
 - 1) Provide motor-operated doors with combination bottom weatherseal and sensor edge.
 - 2) In addition, provide replaceable, adjustable, continuous, flexible, 1/8-inch thick seals of flexible vinyl, rubber, or neoprene at door jambs for a weathertight installation.

B. Coiling Grilles

- Grille Curtain Materials and Construction:
 - a. General: Fabricate overhead coiling grille curtain consisting of a network of 5/16-inch minimum diameter horizontal rods, or rods covered with tube spacers, spaced as indicated. Interconnect rods by vertical links approximately 5/8 inch wide, spaced as indicated and rotating on rods.
 - b. Space rods at approximately 1-1/2 inches o.c.
 - 1) Space links approximately 9 inches apart in a straight in-line pattern.
 - Stainless-Steel Grille Curtain: ASTM A 666 "Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar," Type 300 series.

2. Endlocks:

a. Continuous end links, chains, or other devices at ends of rods; locking and retaining grille curtain in guides against excessive pressures, maintaining grille curtain alignment, and preventing lateral movement.

Bottom Bar:

- a. Manufacturer's standard continuous channel, tubular shape, or two angles, finished to match grille.
- b. Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene; for placement between angles or fitted to shape, as a cushion bumper for grille.
- c. Provide motor-operated grilles with combination bottom astragal and sensor edge.

4. Grille Curtain Jamb Guides:

- a. Manufacturer's standard extruded-aluminum shape having curtain groove with return lips or bars to retain curtain. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent overtravel of curtain.
- b. Removable Posts and Jamb Guides: Manufacturer's standard.

C. Hoods:

- 1. Form round hoods to act as weatherseal and entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods, and provide fascia for any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sagging.
 - a. Fabricate hoods for steel doors of minimum 0.028-inch thick, hot-dip galvanized steel sheet with G90 zinc coating, complying with ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron, Alloy-Coated (Galvanealed) by the Hot-Dip Process."
 - b. Fabricate hoods for stainless-steel doors of minimum 0.025-inch thick stainless-steel sheet, Type 304, complying with ASTM A 666 "Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar."

- c. For fire-rated assemblies, include automatic drop baffle to guard against passage of smoke or flame. Fabricate hoods for stainless-steel grilles of minimum
 0.025-inch- (0.65-mm-) thick stainless-steel sheet, Type 300 series, complying with ASTM A 666 "Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar."
- 2. Counter Shutter Integral Frame, Hood, and Fascia: Provide welded assemblies of the following sheet metal:
 - a. Fabricate from minimum 0.0625-inch thick stainless-steel sheet, Type 304, complying with ASTM A 240 "Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications" or ASTM A 666 "Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar."

D. Counterbalancing mechanism:

- General: Counterbalance curtain by means of adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- 2. Counterbalance Barrel: Fabricate spring barrel of hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of curtain and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- 3. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Provide cast-steel barrel plugs to secure ends of springs to barrel and shaft.
- 4. Fabricate torsion rod for counterbalance shaft of cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- 5. Brackets: Provide mounting brackets of manufacturer's standard design, either cast iron or cold-rolled steel plate, galvanized.

E. Operators:

- 1. Push-up: Design counterbalance mechanism so required lift or pull for door operation does not exceed 25 lbf (111 N).
- 2. Chain-Hoist: Provide manual chain-hoist operator consisting of endless steel hand chain, chain pocket wheel and guard, and gear-reduction unit with a maximum 35-lbf (155-N) force for door operation. Provide alloy steel hand chain with chain holder secured to operator guide.
 - a. Provide through-wall shaft operator.
- 3. Crank-Hoist: Provide crank-hoist operator consisting of crank and crank gearbox, steel crank drive shaft, and gear-reduction unit. Size gears to require no more than 35-lbf (155-N) force to turn the crank. Fabricate gearbox to be oil tight and completely enclose operating mechanism. Provide manufacturer's standard crank-locking device.
 - a. Provide manufacturer's standard removable operating arm for each crank-gear unit.
 - b. Provide through-wall shaft operator.

4. Electric Motor:

a. Provide electric door operator assembly of size and capacity recommended andprovided by door manufacturer for door specified complying with CEC, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

- b. Disconnect Device: Provide hand-operated disconnect or mechanism for automatically engaging chain and sprocket operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- c. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.
- d. Door-Operator Type: Provide wall-, hood-, or bracket-mounted, jackshaft-type door operator unit consisting of electric motor drive, and chain and sprocket secondary drive.
- e. Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motors complying with NEMA MG 1; with overload protection; sized to start, accelerate, and operate door in either direction from any position, at not less than 2/3 fps and not more than 1 fps, without exceeding nameplate ratings or service factor.
 - 1) Voltage.
 - 2) Amps.
 - 3) Horse Power.
 - 4) Type: Polyphase, medium-induction type.
 - 5) Service Factor: According to NEMA MG 1, unless otherwise indicated.
 - 6) Coordinate wiring requirements and electrical characteristics of motors with building electrical system.
 - 7) Provide open dripproof-type motor, and controller with NEMA ICS 6, Type 1 enclosure.
- f. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with CEC Class 2-control circuit, maximum 24-V, ac or dc.
- g. Remote-Control Station: Provide momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
- h. Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
- i. Obstruction Detection Device: Provide each motorized door with indicated external automatic safety sensor capable of protecting full width of door opening.
 Activation of sensor immediately stops and reverses downward door travel.
 - 1) Sensor Edge, "Phantom Featheredge," or approved equivalent: Provide each motorized door with an automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor immediately stops and reverses downward door travel.
 - 2) Connect to control circuit using manufacturers wireless technology.
 - 3) Provide electrically actuated automatic bottom bar.
- j. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
- k. Provide safety interlock switch to disengage power supply when curtain is locked.

F. Hardware:

- 1. Locking Devices: Fabricate locking device assembly with lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.
 - a. Locking Bars, full-disc cremone type, both sides, operable from inside only.
 - b. Lock Cylinder Specification Section HARDWARE.
 - c. Chain Lock Keeper: Specification Section HARDWARE.
 - d. Power-operated doors: If door unit is power-operated, provide safety interlock switch to disengage power supply when door is locked.
 - e. Fire-Rated doors shall not have mechanical device to lock doors in "Open" position.

- 2. Push/Pull Handles: For push-up-operated or emergency-operated curtains, provide manufacturer's standard lifting handles on each side of curtains. Maximum effort shall not exceed 30 pounds to pull/push up or down.
 - a. Provide pull-down straps or pole hooks for curtains more than 84 inches (2130 mm) high.
- 3. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from coil side.

2.3 ACCESSORIES

- A. Fire Door Product Systems, complying with NFPA 80 and UL:
 - 1. Auto-Test:
 - a. "Test-A-Fire Logic" System, or approved equivalent:
 - 1) Allows connection of doors to building alarm system.
 - 2) Prevents mechanical closing during momentary power outages.
 - 3) Permits testing of door without resetting.
 - 4) Automatically reverses door if obstruction is contacted.
 - 5) Door closes at a constant rate of speed.
 - 2. Simple Test:
 - a. "FireFly III Plus Time Delayed Release" System, or approved equivalent:
 - 1) Built-in 4-amp hour battery backup.
 - 2) Time delayed door closing to meet code requirements.
 - 3) Prevents mechanical closing due to momentary power outages.
 - 4) Visual and audible remote warning annunciator to warn that the door will be closing.
 - 5) Automatic resetting of door if alarm system activation is cancelled within ten seconds.
 - 6) Power outages of less than ten seconds will not affect the closing of the door.

2.4 FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Steel and Galvanized Steel Finishes:
 - 1. Zinc-Coated (Galvanized) Steel: ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron, Alloy-Coated (Galvanealed) by the Hot-Dip Process," G90 coating designation; structural quality.
 - 2. Powder Coated: Manufacturer's "ColorCote" powder color coating system.
 - a. Hot dipped galvanized G-90 coating consistent with ASTM A 653 "Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron, Alloy-Coated (Galvanealed) by the Hot-Dip Process," G90 coating designation; structural quality.
 - b. Bonderized coating for prime coat adhesion

- c. Factory applied Thermosetting Powder Coating applied with a minimum thickness of 2 mils.
- d. The color shall be selected by the architect and shall be chosen from custom color selection

D. Stainless-Steel Finishes:

- 1. Remove or blend stretch lines and tool and die marks into finish.
 - a. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- 2. Bright, Directional Polish: No. 4 finish.
- 3. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

E. Aluminum Finishes:

- 1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 - a. Manufacturer's standard mill finish.

F. Wood Finishes:

1. Finish in accordance with Specification Section - PAINTING.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

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

3.2 PREPARATION

A. Coordination:

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

B. Protection:

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

C. Surface preparation:

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

3.3 INSTALLATION

A. General:

- 1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
- 2. In accordance with approved submittals.
- 3. In accordance with Regulatory Requirements.
 - a. Install fire-rated doors to comply with NFPA 80.
- 4. Set plumb, level, and square.

B. Layout:

1. Lines shall be straight and true.

3.4 ADJUSTING

- A. Lubricate bearings and sliding parts; adjust doors to operate easily, free of warp, twist, or distortion and with weathertight fit around entire perimeter.
- B. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
 - 1. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.

3.5 CLEANING

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

3.6 DEMONSTRATION

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

3.7 PROTECTION

- A. Protection from traffic:
 - 1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.8 SCHEDULES

- A. Coiling Door Manufacturer, as described herein: CORNELL/COOKSON
- B. Service Doors, Non-Insulated and Non-Rated. See drawings for sizes:
 - 1. Model Number: **FP**
 - a. Mounting: Face of Wall.
 - b. Operation: Push-Up.c. Slat Type: #5 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish:
 - 1) FP-G Galvanized Steel.
 - 2) FP-P Powder Coat.
 - f. Locking Device: Cylinder
 - g. Remarks: N/A.
 - 2. Model Number: **JP**
 - a. Mounting: Between Jamb.
 - b. Operation: Push-Up.c. Slat Type: #5 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish:
 - 1) JP-G Galvanized Steel.
 - 2) JP-P Powder Coat.
 - 3) JP-S Stainless Steel.
 - f. Locking Device: Cylinder.
 - g. Remarks: N/A.
 - 3. Model Number: **FC**
 - a. Mounting: Face of Wall.
 - b. Operation: Chain.
 - c. Slat Type: #5 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish: Galvanized Steel.
 - f. Locking Device: Cylinder.
 - g. Remarks: N/A.
 - 4. Model Number: **JC**
 - a. Mounting: Between Jamb.
 - b. Operation: Chain.
 - c. Slat Type: #5 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish: Galvanized Steel.
 - f. Locking Device: Cylinder.
 - g. Remarks: N/A.
 - 5. Model Number: **FK**
 - a. Mounting: Face of Wall.
 - b. Operation: Crank.
 - c. Slat Type: #5 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish: Galvanized Steel.
 - f. Locking Device: Cylinder.
 - g. Remarks: N/A.
 - 6. Model Number: **JK**
 - a. Mounting: Between Jamb.

b. Operation: Crank.c. Slat Type: #5 (Flat).d. Curtain Gage: 22 ga.(0.0299").

e. Curtain Finish: Galvanized Steel.

f. Locking Device: Padlock.

g. Remarks: N/A.

7. Model Number: **FCM**

a. Mounting: Face of Wall.

b. Operation: Motor.

c. Slat Type: Slat #5 (Flat).
d. Curtain Gage: 22 ga.(0.0299").
e. Curtain Finish: Galvanized Steel.

f. Locking Device: Cylinder.

g. Remarks: Verify size of motor with door size requirements.

8. Model Number: **JCM**

a. Mounting: Between Jamb.

b. Operation: Motor.

c. Slat Type: Slat #5 (Flat).
d. Curtain Gage: 22 ga.(0.0299").
e. Curtain Finish: Galvanized Steel.

f. Locking Device: Cylinder.

g. Edge Technology:Phantom Edge.

h. Remarks: Verify size of motor with door size requirements.

C. Service Doors, Non-Insulated and Rated. See drawings for sizes:

1. Model Number: **FD-1**

a. Mounting: Face of Wall.
b. Operation: Push-Up.
c. Slat Type: Slat #5 (Flat).
d. Curtain Gage: 22 ga.(0.0299").
e. Curtain Finish: Galvanized Steel.

f. Fire Release Mechanism: Simple-Test.

g. Manufacturer's Dimensional Range: Up to 80 sq.ft. or 8 ft. in height.

h. Locking Device: Cylinder.

i. Remarks: N/A.

2. Model Number: **FD-4**

a. Mounting: Between Jamb.

b. Operation: Push-Up.

c. Slat Type: Slat #5 (Flat).

d. Curtain Gage: 22 ga.(0.0299").e. Curtain Finish: Galvanized Steel.

f. Fire Release Mechanism: Simple-Test.

g. Manufacturer's Dimensional Range: Up to 80 sq.ft. or 8 ft. in height.

h. Locking Device: Cylinder.

i. Remarks: N/A.

3. Model Number: **FD-2A Face**

a. Mounting: Face of Wall.

b. Operation: Chain.

c. Slat Type: Slat #5 (Flat).

d. Curtain Gage: 22 ga.(0.0299").

e. Curtain Finish: Galvanized Steel.

f. Fire Release Mechanism: Test-A-Fire Logic.

g. Locking Device: Cylinder.

h. Remarks: N/A.

- 4. Model Number: **FD-2A Jamb**
 - a. Mounting: Between Jamb.
 - b. Operation: Chain.
 - c. Slat Type: Slat #5 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish: Galvanized Steel.
 - f. Fire Release Mechanism: Auto-Test.
 - g. Locking Device: Cylinder.
 - h. Remarks: N/A.
- 5. Model Number: **FD-3 Face**
 - a. Mounting: Face of Wal.
 - b. Operation: Crank.
 - c. Slat Type: Slat #5 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish: Galvanized Steel.
 - f. Fire Release Mechanism: Simple-Test.
 - g. Locking Device: Cylinder.
 - h. Remarks: N/A.
- 6. Model Number: **FD-3 Jamb**
 - a. Mounting: Between Jamb.
 - b. Operation: Crank.
 - c. Slat Type: Slat #5 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish: Galvanized Steel.
 - f. Fire Release Mechanism: Simple-Test.
 - g. Locking Device: Cylinder.
 - h. Remarks: N/A.
- 7. Model Number: FDO-A Face
 - a. Mounting: Face of Wall.
 - b. Operation: Motor.
 - c. Slat Type: Slat #5 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish: Powder Coated.
 - f. Fire Release Mechanism: Auto-Test.
 - g. Locking Device: Cylinder.
 - h. Remarks: Verify size of motor with door size requirements.
- 8. Model Number: **FDO-A Jamb**
 - a. Mounting: Between Jamb Mounted.
 - b. Operation: Motor.
 - c. Slat Type: Slat #5 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish: Powder Coated.
 - f. Manufacturer's Dimensional Range: Suitable for any door size or height.
 - g. Fire Release Mechanism: Auto-Test.
 - h. Locking Device: Cylinder.
 - i. Remarks: Verify size of motor with door size requirements.
- D. Service Doors, Insulated and Non-Rated. See drawings for sizes:
 - 1. Model Number: **FCWI**
 - a. Mounting: Face of Wall Mounted.
 - b. Operation: Chain.
 - c. Slat Type: Slat #44 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish: Galvanized Steel.

- f. Manufacturer's Dimensional Range: Up to 80 sq.ft. or 8 ft. in height.
- g. Locking Device: Cylinder.
- h. Remarks: N/A.
- 2. Model Number: FKWI
 - a. Mounting: Face of Wall.
 - b. Operation: Crank.
 - c. Slat Type: Slat #44 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish: Galvanized Steel.
 - f. Manufacturer's Dimensional Range: Up to 80 sq.ft. or 8 ft. in height.
 - g. Locking Device: Cylinder.
 - h. Remarks: N/A.
- 3. Model Number: **FMWI**
 - a. Mounting: Face of Wall.
 - b. Type of Door Operation: Motor.
 - c. Slat Type: Slat #44 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish: Galvanized Steel.
 - f. Manufacturer's Dimensional Range: Suitable for any door size or height.
 - g. Locking Device: Cylinder.
 - h. Remarks: Verify size of motor with door size requirements.
- E. Service Door, Insulated and Rated. See drawings for sizes:
 - 1. Model Number: FDI-2
 - a. Mounting: Face of Wall.
 - b. Type of Door Operation: Chain.
 - c. Slat Type: #45 (Flat).
 - d. Curtain Gage, Interior and Exterior: 22 ga.(0.0299").
 - e. Curtain Finish: Galvanized Steel.
 - f. Fire Release Mechanism: Simple Test.
 - g. Locking Device: Padlock.
 - h. Remarks: N/A.
 - 2. Model Number: **FDOI-B**
 - a. Mounting: Face of Wall.
 - b. Type of Door Operation: Motor.
 - c. Slat Type: #45 (Flat).
 - d. Curtain Gage, Interior and Exterior: 22 ga.(0.0299").
 - e. Curtain Finish: Galvanized Steel.
 - f. Fire Release Mechanism: Auto-Test.
 - g. Locking Device: Powder Coated.
 - h. Edge Technology:Phantom Edge.
 - i. Remarks: N/A.
- F. Coiling Grilles, Non-rated. See drawings for sizes:
 - 1. Model Number: **FPG-SS**
 - a. Mounting: Face of Wall.
 - b. Operation: Push-Up.
 - c. Slat Type: Grille.
 - d. Grille Pattern: 5014-M92.
 - e. Curtain Finish: Stainless Steel.
 - f. Locking Device: Cylinder.
 - g. Remarks: N/A.
 - 2. Model Number: **JPG-SS**
 - a. Mounting: Between Jamb.

b. Operation: Push-Up.
c. Slat Type: Grille.
d. Grille Pattern: 5014-M92.
e. Curtain Finish: Stainless Steel.
f. Locking Device: Cylinder.

g. Remarks: N/A.

3. Model Number: FCG-SS
a. Mounting: Face of Wall.

b. Operation: Chain.
c. Slat Type: Grille.
d. Grille Pattern: 5014-M92.
e. Curtain Finish: Stainless Steel.
f. Locking Device: Cylinder.

g. Remarks: N/A.

4. Model Number: **JCG-SS**

a. Mounting: Between Jamb.

b. Operation: Chain.
c. Slat Type: Grille.
d. Grille Pattern: 5014-M92.
e. Curtain Finish: Stainless Steel.
f. Locking Device: Cylinder.

g. Remarks: N/A.

5. Model Number: **FMG-SS**

a. Mounting: Face of Wall.

b. Operation: Motor.
c. Slat Type: Grille.
d. Grille Pattern: 5014-M92.
e. Curtain Finish: Stainless Steel.
f. Locking Device: Cylinder.

g. Remarks: Verify size of motor with door size requirements.

6. Model Number: **JMG-SS**

a. Mounting: Between Jamb.

b. Operation: Motor.
c. Slat Type: Grille.
d. Grille Pattern: 5014-M92.
e. Curtain Finish: Stainless Steel.
f. Locking Device: Cylinder.

g. Edge Technology:Phantom Edge.

h. Remarks: Verify size of motor with door size requirements.

G. Counter Shutters, Non-Rated. See drawings for sizes:

1. Model Number: **CD8-1**

a. Mounting: Face of Wall.
b. Operation: Push-Up.
c. Slat Type: Slat #4 (Flat).
d. Curtain Gage: 16 ga. (0.040").
e. Curtain Material: Aluminum.

f. Manufacturer's Dimensional Range: Up to 80 sq.ft. or 8 ft. in height.

g. Locking Device: Cylinder.

h. Remarks: N/A.

2. Model Number: CD8-2

a. Mounting: Between Jamb.b. Operation: Push-Up.c. Slat Type: Slat #4 (Flat).

- d. Curtain Gage: 16 ga. (0.040").
- e. Curtain Material: Aluminum.
- f. Manufacturer's Dimensional Range: Up to 80 sq.ft. or 8 ft. in height.
- g. Locking Device: Cylinder.
- h. Remarks: N/A.
- 3. Model Number: **CD8-3**
 - a. Mounting: Face of Wall.
 - b. Operation: Crank.
 - c. Slat Type: Slat #4 (Flat).
 - d. Curtain Gage: 16 ga. (0.040").
 - e. Curtain Material: Aluminum.
 - f. Locking Device: Cylinder.
 - g. Remarks: N/A.
- 4. Model Number: CD8-4
 - a. Mounting: Between Jamb.
 - b. Operation: Crank.
 - c. Slat Type: Slat #4 (Flat).
 - d. Locking Device: Cylinder.
 - e. Curtain Gage: 16 ga. (0.040").
 - f. Curtain Material: Aluminum.
 - g. Remarks: N/A.
- 5. Model Number: **CD8-1M**
 - a. Mounting: Face of Wall.
 - b. Operation: Motor.
 - c. Slat Type: Slat #4 (Flat).
 - d. Curtain Gage: 16 ga. (0.040").
 - e. Curtain Material: Aluminum.
 - f. Manufacturer's Dimensional Range: Suitable for any door size or height.
 - g. Locking Device: Cylinder.
 - h. Remarks: Verify size of motor with door size requirements.
- 6. Model Number: **CD8-2M**
 - a. Mounting: Between Jamb.
 - b. Operation: Motor.
 - c. Slat Type: Slat #4 (Flat).
 - d. Curtain Gage: 16 ga. (0.040").
 - e. Curtain Material: Aluminum.
 - f. Manufacturer's Dimensional Range: Suitable for any door size or height.
 - g. Locking Device: Cylinder.
 - h. Remarks: Verify size of motor with door size requirements.
- 7. Model Number: **CD10-1**
 - a. Mounting: Face of Wall.
 - b. Operation: Push-Up.
 - c. Slat Type: Slat #5 (Flat).
 - d. Curtain Gage: 20 ga. (0.0375").
 - e. Curtain Finish: Stainless Steel Slats.
 - f. Manufacturer's Dimensional Range: Up to 80 sq.ft. or 8 ft. in height.
 - g. Locking Device: Cylinder.
 - h. Remarks: N/A.
- 8. Model Number: **CD10-2**
 - a. Mounting: Between Jamb.
 - b. Operation: Push-Up.
 - c. Slat Type: Slat #5 (Flat).
 - d. Curtain Gage: 20 ga. (0.0375").
 - e. Curtain Finish: Stainless Steel Slats.

- f. Manufacturer's Dimensional Range: Up to 80 sq.ft. or 8 ft. in height.
- g. Locking Device: Cylinder.
- h. Remarks: N/A.
- 9. Model Number: **CD10-3**
 - a. Mounting: Face of Wall.
 - b. Operation: Crank.
 - c. Slat Type: Slat #5 (Flat).
 - d. Curtain Gage: 20 ga. (0.0375").
 - e. Curtain Finish: Stainless Steel Slats.
 - f. Locking Device: Cylinder.
 - g. Remarks: N/A.
- 10. Model Number: **CD10-4**
 - a. Mounting: Between Jamb.
 - b. Operation: Push-Up.
 - c. Slat Type: Slat #5 (Flat).
 - d. Curtain Gage: 20 ga. (0.0375").
 - e. Curtain Finish: Stainless Steel Slats.
 - f. Manufacturer's Dimensional Range: Up to 80 sq.ft. or 8 ft. in height.
 - g. Locking Device: Cylinder.
 - h. Remarks: N/A.
- 11. Model Number: **CD10-1M**
 - a. Mounting: Face of Wall.
 - b. Operation: Motor.
 - c. Slat Type: Slat #5 (Flat).
 - d. Curtain Gage: 20 ga. (0.0375").
 - e. Curtain Finish: Stainless Steel Slats.
 - f. Locking Device: Cylinder.
 - g. Remarks: Verify size of motor with door size requirements.
- 12. Model Number: CD10-2M
 - a. Mounting: Between Jamb.
 - b. Operation: Motor.
 - c. Slat Type: Slat #5 (Flat).
 - d. Curtain Gage: 20 ga. (0.0375").
 - e. Curtain Finish: Stainless Steel Slats.
 - f. Manufacturer's Dimensional Range: Up to 80 sq.ft. or 8 ft. in height.
 - g. Locking Device: Cylinder.
 - h. Remarks: Verify size of motor with door size requirements.
- H. Counter Shutter Doors, Non Rated, Wood Slats. See drawings for sizes:
 - 1. Model Number: CDW-1
 - a. Mounting: Face of Wall.
 - b. Operation: Push-Up.
 - c. Slat Type: Wood.
 - d. Slat Properties: 3/4" x 1-5/16" interconnecting slats.
 - e. Curtain Material: Birch.
 - f. Manufacturer's Dimensional Range: Up to 9'-4" wide x 8'-4" high.
 - g. Locking Device: Cylinder.
 - h. Remarks: Finish according to Specification Section PAINTING.
 - 2. Model Number: CDW-2
 - a. Mounting: Between Jamb.
 - b. Operation: Push-Up.
 - c. Slat Type: Wood.
 - d. Slat Properties: 3/4" x 1-5/16" interconnecting slats.
 - e. Curtain Material: Birch.

- f. Manufacturer's Dimensional Range: Up to 9'-4" wide x 8'-4" high.
- g. Locking Device: Cylinder.
- h. Remarks: Finish according to Specification Section PAINTING.

I. Counter Shutter Doors, Rated. See drawings for sizes:

- 1. Model Number: **FD10-1**
 - a. Mounting: Face of Wall.
 - b. Operation: Push-Up.
 - c. Slat Type: Slat #5 (Flat).
 - d. Curtain Gage: 20 Gage (0.0375").
 - e. Curtain Finish: Stainless Steel.
 - f. Manufacturer's Dimensional Range: Up to 80 sq.ft. or 8 ft. in height.
 - g. Locking Device: Cylinder.
 - h. Remarks: N/A.
- 2. Model Number: FD10-2
 - a. Mounting: Between Jamb.
 - b. Operation: Push-Up.
 - c. Slat Type: Slat #5 (Flat).
 - d. Curtain Gage: 20 Gage (0.0375").
 - e. Curtain Finish: Stainless Steel Slats.
 - f. Manufacturer's Dimensional Range: Up to 80 sq.ft. or 8 ft. in height.
 - g. Locking Device: Cylinder.
 - h. Remarks: N/A.
- 3. Model Number: **FD10-3**
 - a. Mounting: Face of Wall.
 - b. Operation: Crank.
 - c. Slat Type: Slat #5 (Flat).
 - d. Curtain Gage: 20 Gage (0.0375").
 - e. Curtain Finish: Stainless Steel Slats.
 - f. Manufacturer's Dimensional Range: Up to 80 sq.ft. or 8 ft. in height.
 - g. Locking Device: Cylinder.
 - h. Remarks: N/A.
- 4. Model Number: **FD10-4**
 - a. .Mounting: Between Jamb Mounted.
 - b. Operation: Crank
 - c. Slat Type: Slat #5 (Flat).
 - d. Curtain Gage: 20 Gage (0.0375").
 - e. Curtain Finish: Stainless Steel Slats.
 - f. Locking Device: Cylinder.
 - g. Remarks: N/A.
- 5. Model Number: **FDO-A10-1M**
 - a. Mounting: Face of Wall.
 - b. Type of Door Operation: Motor.
 - c. Slat Type: Slat #5 (Flat).
 - d. Curtain Gage: 20 Gage (0.0375").
 - e. Curtain Finish: Stainless Steel Slats.
 - f. Manufacturer's Dimensional Range: Suitable for any door size or height.
 - g. Locking Device: Cylinder.
 - h. Edge Type: Phantom Featheredge.
 - i. Remarks: Verify size of motor with door size requirements.
- 6. Model Number: **FDO-A10-2M**
 - a. Mounting: Between Jamb.
 - b. Operation: Motor.
 - c. Slat Type: Slat #5 (Flat).

- d. Curtain Gage: 20 Gage (0.0375").e. Curtain Finish: Stainless Steel Slats.
- f. Manufacturer's Dimensional Range: Suitable for any door size or height.
- g. Locking Device: Cylinder.
- h. Edge Type: Phantom Featheredge.
- i. Remarks: Verify size of motor with door size requirements.
- J. Counter Shutter Doors, Smoke and Fire Rated. See drawings for sizes:
 - 1. Model Number: **SD10-1**
 - a. Mounting: Face of Wall.
 - b. Operation: Push-Up.
 - c. Slat Type: Slat #10 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish: Stainless Steel.
 - f. Fire Release Mechanism: Simple-Test.
 - g. Locking Device: Cylinder.
 - h. Remarks: N/A.
 - 2. Model Number: **SD10-2**
 - a. Mounting: Between Jamb.
 - b. Operation: Push-Up.
 - c. Slat Type: Slat #10 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish: Stainless Steel.
 - f. Fire Release Mechanism: Simple-Test.
 - g. Locking Device: Cylinder.
 - h. Remarks: N/A.
 - 3. Model Number: **SD10-3**
 - a. Mounting: Face of Wall.
 - b. Operation: Crank.
 - c. Slat Type: Slat #10 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish: Stainless Steel.
 - f. Fire Release Mechanism: Simple-Test.
 - g. Locking Device: Cylinder.
 - h. Remarks: N/A.
 - 4. Model Number: **SD10-4**
 - a. Mounting: Between Jamb
 - b. Operation: Crank.
 - c. Slat Type: Slat #10 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish: Stainless Steel.
 - f. Fire Release Mechanism: Simple-Test.
 - g. Locking Device: Cylinder.
 - h. Remarks: N/A.
 - 5. Model Number: **SDO-A10-1M**
 - a. Mounting: Face of Wall.
 - b. Operation: Motor.
 - c. Slat Type: Slat #10 (Flat).
 - d. Curtain Gage: 22 ga.(0.0299").
 - e. Curtain Finish: Stainless Steel.
 - f. Manufacturer's Dimensional Range: Up to 12' wide or 9' high.
 - g. Fire Release Mechanism: Auto-Test.
 - h. Locking Device: Cylinder.
 - i. Remarks: Verify size of motor with door size requirements.

6. Model Number: **SDO-A10-2M**

a. Mounting: Between Jamb.

b. Operation: Motor.

c. Slat Type: Slat #10 (Flat).
d. Curtain Gage: 22 ga.(0.0299").
e. Curtain Finish: Stainless Steel.

f. Manufacturer's Dimensional Range: Up to 12' wide or 9' high.

g. Fire Release Mechanism: Auto-Test.

h. Locking Device: Cylinder.

i. Remarks: Verify size of motor with door size requirements.

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 08 70 00 - HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 **SUMMARY**

This Section includes the following: A.

- Provide all material, labor, equipment and services necessary to completely install all Door Hardware materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
 - 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.
 - This Section includes the following, but is not necessarily limited to: b.
 - Door Hardware, including electric hardware.
 - 2) Storefront and Entrance door hardware.
 - Gate Hardware. 3)
 - 4) Digital keypad access control devices.
 - 5) Hold-open closers with smoke detectors.
 - Wall or floor-mounted electromagnetic hold-open devices. 6)
 - 7) Power supplies for electric hardware.
 - 8) Low-energy door operators plus sensors and actuators.
 - Thresholds, gasketing and weather-stripping. 9)
 - Door silencers or mutes.
- Coordinate with the Contractor and the hardware being supplied under specification section 08 41 2. 00 – STOREFRONTS.
- 3. Storefront trade contractor shall install the continuous hinge and hang the door. The contractor shall determine and coordinate the balance of the hardware installation.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:

1.	03 30 00	CAST-IN-PLACE CONCRETE
2.	05 12 00	STEEL AND FABRICATIONS
3.	06 10 00	ROUGH CARPENTRY
4.	06 22 00	MILLWORK
5.	06 41 23	MODULAR CASEWORK
6.	07 92 00	SEALANTS
7.	08 11 00	METAL DOORS AND FRAMES
8.	08 14 16	WOOD DOORS
9.	08 33 00	COILING DOORS
10.	08 34 73	ACOUSTICAL DOORS AND FRAMES
11.	08 41 00	STOREFRONTS
12.	08 56 59	SERVICE WINDOWS

- 13. 10 05 00 MISCELLANEOUS SPECIALTIES
 14. 11 16 16 SAFES
 15. 14 24 23 HYDRAULIC ELEVATORS
 16. 32 19 19 ORNAMENTAL METAL
- 17. 32 31 13 CHAIN LINK
- 18. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
 - a. Alarm Systems and Power Interface.

1.3 REFERENCES

A. Standards:

- 1. In accordance with the following standards:
- 2. In accordance with the following standards:
 - a. ADAAG Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities.
 - b. ASAHC American Society of Architectural Hardware Consultants.
 - c. BHMA Builders Hardware Manufacturers Association.
 - d. DHI Door and Hardware Institute.
 - e. HMMA Hollow Metal Manufacturer's Association.
 - f. NFPA National Fire Protection Association.
 - g. UL Underwriter's Laboratories.
 - h. WHI Warnock Hersey Incorporated.
 - i. 2019 cbc Chapter 11B

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Coordination Drawings:
 - a. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
 - 2. Product Data.
 - a. Submit manufacturer's technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish (including any custom colors), and other information necessary to show compliance with requirements.
 - b. Provide Key Control System submittal for review prior to fabrication or ordering. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
 - c. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled
 - 3. Shop Drawings (Hardware Schedule):
 - a. Submit shop drawings (Hardware Schedule) showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work. Include the following information:
 - b. Include a Cover Sheet with;
 - 1) Job Name, location, telephone number.
 - 2) Architects name, location and telephone number.
 - 3) Contractors name, location, telephone number and job number.

- 4) Suppliers name, location, telephone number and job number.
- 5) Hardware representative's name, location and telephone number.
- c. Job Index information included;
 - 1) Numerical door number index including; door number, hardware heading number and page number.
 - 2) 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.
 - 3) Manufacturers' names and abbreviations for all materials.
 - 4) Explanation of abbreviations, symbols, and codes used in the schedule.
 - 5) Mounting locations for hardware.
 - 6) Fastenings and other pertinent information.
 - 7) Clarification statements or questions.
 - 8) Catalog cuts and manufacturer's technical data and instructions.
 - 9) Door and frame sizes and materials.
- d. Wiring Diagrams: Provide product data and wiring and riser diagrams for all electrical products listed in the Hardware Schedule portion of this section.
- 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.
- g. Furnish as-built/as-installed schedule with close-out documents, including keying schedule, wiring/riser diagrams, manufacturers' installation, adjustment and maintenance information.
- h. Fire Door Assembly Testing: Submit a written record of each fire door assembly to the Owner to be made available to the Department of the State Architect (DSA) for future building inspections.
- 4. Quality Assurance/Control Submittals:
 - a. Certificates:
 - 1) Submit three (3) copies of certificates.
 - 2) Provide a letter on Contractor's Letterhead certifying work provided, meets or exceeds, the requirements of this Section.
 - a) Provide a statement on the certificate that all hardware has been furnished in accordance with the Contract Documents.
 - b) Provide a statement on the certificate that all hardware has been installed correctly and in proper working order.
- 5. Closeout Submittals:
 - a. Maintenance Data in accordance with Specification Section PROJECT CLOSEOUT.
 - b. Operation Data in accordance with Specification Section PROJECT CLOSEOUT.
 - c. Record Documents in accordance with Specification Section RECORD DOCUMENTS.
 - d. Warranty in accordance with Specification Section WARRANTIES.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

2. Manufacturer/Supplier Qualifications:

- a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- b. Firm must be 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) Supplier shall meet with the Owner to finalize keying requirements and to obtain final instructions in writing.
 - 3) Stock parts for products supplied and be capable of repairing and replacing hardware items found defective within warranty periods.

B. Regulatory Requirements:

- 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. CBC General Requirements:
 - 1) All rated doors are to be positive latching and self-closing.
 - 2) All 20 minute rated assemblies shall be provided with approved gasketing material so installed to provide a seal where the door meets the stop on both sides and across the top.
 - 3) Lever handles shall return to within 1/2 inch off door face.
 - 4) Hand-activated hardware shall be mounted between 34" to 44" AFF; lever-type hardware, panic bars, push-pull activating and lever for thumb-turn dead bolt hardware shall comply with CBC Section 11B-309.4 and 11B-404.2.7.
 - a) All hand activated hardware shall be easy to operate with one hand, without tight grasping, pinching, or twisting of the wrist to operate.
 - 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.
 - a) 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".
 - 6) Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.
 - 7) Thresholds in the POT shall be in conformance with CBC Section 11B-404.2.5.
 - 8) Effort to operate doors shall be a maximum of 5 lbs at exterior and interior doors per CBC Section 11B-404.2.9.
 - 9) Closer Delay Time shall comply with CBC Section 11B-404.2.8.1.
 - 10) Where Flush Bolts occur in the POT, they shall be Automatic Flush Bolts (accessible).

C. Certificates:

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

2. Include statements to establish standards by which the work will be judged. Field Samples are physical examples illustrating finishes, coatings, or finish such as concrete brick or stone. Replace the following language with appropriate Field Sample requirements.

D. Meetings:

- 1. Pre-installation Conference: Scheduled by the Contractor prior to the start of work.
 - a. Review hardware schedule, products and installation procedures.
 - b. Review Owner's keying standards.
 - c. Coordinate the work with all other related work.
 - d. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
- 2. Progress Meetings: Scheduled by the Contractor during the performance of the work.
 - a. Review proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Final Inspection: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 - 1. Products shall be individually wrapped.
 - 2. Packaging of door hardware shall be the responsibility of the supplier.
 - a. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule.
 - 1) Two or more identical sets may be packaged in same container.
 - 3. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage. Damaged products will not be accepted at final inspection.

B. Acceptance at Site:

- 1. Products shall be labeled also with model numbers, catalog numbers, function and finish, identification related to final hardware schedule, and include basic installation instructions with each item or package.
- 2. Damaged products will not be accepted.

C. Storage and protection:

- 1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.
- 2. Provide secure lock-up for door hardware delivered to the Project, but not yet installed.
 - a. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.7 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Closers:
 - 1) Warranty Period Ten (10) Years.
 - a) Exception: Electronic Closers shall be Two (2) Years.
 - b. Exit Devices:
 - 1) Warranty Period Ten (10) Years.
 - c. All other hardware:
 - 1) Warranty Period Ten (10) Years.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES:
 - a. Warranty period One (1) Year.

1.8 MAINTENANCE

- A. Extra Materials:
 - 1. 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.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

<u>Item</u>	Specified Manufacture	er Acceptable Alternate
Hinges	Ives	Hager, Stanley, McKinney
Locks, Latches		
& Cylinders	Schlage	Or Approved Equal
Exit Devices	Von Duprin	Or Approved Equal
Closers	LCN	Or Approved Equal
Gate Closures	Locinox	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	Pemko	NGP, Zero
Seals & Bottoms	Zero	NGP, Pemko

HARDWARE 2123

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

2.2 MATERIALS

A. General:

- 1. Base Metals: Produce hardware units of basic metal and forming method indicating using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified within this specification section for applicable hardware units for finish designations indicated.
- 2. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
- 3. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.
- 4. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners.
 - a. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely.
 - b. Where thru-bolts are used as a means of reinforcing the work, provide sleeves for each thrubolt or use sex screw fasteners.

2.3 MANUFACTURED UNITS

A. General:

- 1. Templates: Provide only template-produced units.
- 2. Provide Phillips flat-head screws complying with the following requirements:
 - a. For metal doors and frames, install machine screws into drilled and tapped holes.
 - b. Finish screw heads shall match surface of hinges or pivots.

B. Butt:

- 1. Provide hinge pins as follows:
 - a. Out-Swing Exterior DoorsNonremovable pins.
 - b. Out-Swing Corridor Doors with Locks Nonremovable pins.
 - c. Interior doors Nonrising pins.
 - d. Tips: Provide flat button and matching plug, finished to match leaves.
- 2. Provide the number of hinges indicated, but not less than the following guidelines:
 - a. Doors with heights up to 60 inches 2 Hinges.
 - b. Door with heights 61 to 90 inches 3 Hinges.
 - c. Doors with heights 91 to 120 inches 4 Hinges.
 - 1) For doors with heights more than 120 inches, provide four hinges, plus one additional hinge for every 30 inches of door height greater than 120 inches.
- 3. Hinges shall be sized in accordance with the following:
 - a. Height:
 - 1) Doors up to 41" wide 4-1/2 inches.
 - 2) Doors 42" to 48" wide 5 inches.
 - b. Width: Sufficient to clear frame and trim when door swings 180 degrees.

C. Continuous:

- 1. Continuous hinges shall be UL rated as required.
- 2. Continuous hinges shall not obscure fire-rating labels of doors or door frames.

D. Lock Cylinders and Keying:

- 1. Lock Cylinders:
 - a. Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.
- 2. Keying:
 - a. Establish a new masterkey system for this project as directed by the keying schedule.
 - b. Furnish all cylinders in the Schlage conventional style except the exit device and removable mullion cylinders which will be supplied in Schlage Full Size Interchangable Core (FSIC). Pack change keys independently (PKI).
 - c. Furnish construction keying for doors requiring locking during construction.
 - 1) Provide two control keys.
 - d. Furnish construction keying for doors requiring locking during construction.
 - 1) For "Split Key" Construction Cylinders (non-IC cylinders) specify "CK" for each keyed cylinder.
 - 2) Provide ten Construction Keys (48-104 "Classic", 48-008 "Everest")
 - 3) Provide two Extractor Tools (35-057)
 - e. Furnish all keys with visual key control.
 - 1) Stamp key "Do Not Duplicate".
 - 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 Keying Transcript (50-123) to owner. End-user to provide letter of authorization to hardware dealer to allow Schlage to mail transcript (bitting list) to the end-user or designated representative.
 - h. 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.
- 3. Deadlocks: Rotating cylinder trim rings of attack-resistant design. Mounting plates and actuator shields of plated cold-rolled steel. Mounting screws of 1/4" diameter steel and protected by drill-resistant ball bearings. Steel alloy deadbolt with hardened steel roller. Strike alloy deadbolt with reinforcer and two 3" long screws. ANSI A156.5, 1992 Grade 1 certified.

E. Key Control System:

- 4. Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended in writing by system manufacturer, with capacity for 150 percent of the number of locks required for the Project.
 - a. Provide hinged-panel type cabinet for wall mounting, or multiple-drawer type cabinet.
 Coordinate location with the Architect. Provide submittal for review before fabrication or ordering.

F. Locks, Latches, and Bolts:

1. Locksets to comply with ANSI A156.2, Series 4000, Grade 1; tested to exceed 3,000,000 cycles. Locksets shall meet ANSI A117.1, Accessible Code.

- 2. Chassis: One piece modular assembly and multi-functional allowing function interchange without disassembly of lockset.
- 3. Spindle shall be deep-draw manufactured not stamped. Spindle and spring cage to be one-piece integrated assembly.
- 4. Anti-rotation plate to be interlocking to the lock chassis. Lock design utilizing bit-tabs are not acceptable.
- 5. Lever Trim: Accessible design, bi-directional, independent assemblies.
- 6. Locks shall be of such construction that when locked, the door may be opened from within by using lever and without the use of a key or special knowledge.
- 7. Thru-bolts to secure anti-rotation plate without sheer line. Fully threaded thru-bolts are not acceptable.
- 8. Spring cage to have double compression springs. Manufacturers utilizing torsion springs are not acceptable.
- 9. Strikes: ANSI curved lip,1-1/4" x 4-7/8", with 1" deep dust box (K510-066). Lips shall be of sufficient length to clear trim and protect clothing.
- 10. Lock Protectors:
 - a. Lock astragals shall be provided with internally threaded fasteners for flat head machine screws. No hex head or carriage bolt fasteners will be permitted.
 - b. Must be through bolted to door.
- 11. Provide 3/4 inch minimum throw of latch on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on fire rated fire openings.
 - a. Provide 1/2 inch minimum throw of latch for other bored and preassembled types of locks
 - b. Provide 3/4 inch minimum throw of latch for mortise locks.
 - c. Provide 1 inch minimum throw for all dead bolts.
- 12. Provide flush bolt heads a minimum of 1/2 inch diameter rods of brass, bronze, or stainless steel with minimum 12 inch long rod for doors up to 7'-0" in height.
 - a. Provide longer rods as necessary for doors exceeding 7'-0" in height.
 - b. 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.
 - c. Manual Flush Bolts only permitted on storage or mechanical openings as scheduled.
 - d. Provide dust-proof strikes at openings using bottom bolts.
- 13. Provide keyed dogging devices on doors equipped with exit devices.
 - a. Do not provide keyed exit devices on fire rated doors equipped with exit devices.
- 14. Where rabbeted door stiles are indicated, provide special rabbeted front on lock and latch units and bolts
- 15. Locksets and Latchsets in Acoustical Doors And Frames require a 3-3/4" backset; verify and coordinate.
- 16. All egress doors shall comply with AB 211 (2009-2010).

G. Exit / Panic Devices:

- 1. Panic hardware shall comply with CCR Title 24, Part 12, Chapter 12-10-302 (a).
 - a. The release mechanism shall be so designed that a horizontal force of 15 lbs. or less will actuate the release bar and latches applied in the direction of travel.
- 2. No surface mounted vertical rods are allowed.
- 3. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 standards.
- 4. Device shall bear UL label for fire and or panic as may be required.
- 5. Removable Mullions:
 - a. Removable with single turn of building key, and securely reinstalled without need for key.
 - b. All removable mullions shall be steel or aluminum clad steel whether or not the opening is fire-rated.

- 6. No manual Flush Bolts on egress doors.
- 7. All internal parts shall be of cold-rolled steel with zinc dichromate coating.
- 8. Mechanism case shall have an average thickness of .140".
- 9. Compression spring engineering.
- 10. Non-handed basic device design with center case interchangeable with all functions.
- 11. All devices shall have quiet return fluid dampeners.
- 12. All latchbolts shall be deadlocking with 3/4" throw and have a self-lubricating coating to reduce friction and wear.
- 13. Device shall bear UL label for fire and or panic as may be required.
- 14. All surface strikes shall be roller type and utilize a plate underneath to prevent movement.
- 15. Lever Trim: "Breakaway" design, forged brass or bronze escutcheon with a minimum of .130" thickness, match lockset lever design.
- 16. Removable Mullions: Removable with single turn of building key. Securely reinstalled without need for key.
- 17. Furnish glass bead kits for vision lites where required.
- 18. All Exit Devices to be sex-bolted to the doors.
- 19. 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. The unlatching force shall not exceed 15 lbs. applied in the direction of travel.
 - b. OR Provide exit devices UL certified to meet maximum 5 pound requirements according to the California Building Code section 11B-309.

H. Push / Pull Units:

1. Provide manufacturer's standard exposed fasteners for installation, thru-bolted for matched pairs but not for single units.

I. Closers and Door Control Devices:

- 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.
 - a. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory.
 - b. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.
- 2. Except as otherwise specifically indicated, comply with manufacturer's written recommendations for size of door control unit depending on size of door, exposure to weather, and anticipated frequency of use.
 - a. Where parallel arms are indicated for closers, provide closer unit one size larger than recommended for use with standard arms.
- 3. Where manual closers are indicated for doors required to be accessible to the physically challenged, provide adjustable units complying with ANSI A 117.1 and CBC Section 11B-404.2.9 provisions for door opening force and delayed action closing.
 - a. Effort to operate shall conform to CBC Section 11B-404.2.9 accessibility requirements as follows:
 - 1) 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. 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 (CBC Section 11B-404.2.8.1). The

- Authority having Jurisdiction may increase the maximum effort to operate Fire Doors to achieve positive latching, but not to exceed 15 lbs maximum.
- 4. Where combination door closers and holders are indicated, provide units designed to hold door in an open position under normal usage and to release and close door automatically under fire conditions.
 - a. Incorporate an integral electromagnetic holder mechanism designed for use with UL listed fire detectors, provided with normally closed switching contacts.
 - b. When indicated, provide integral smoke detector device in combination door closers and holders complying with UL 228, Second Edition.
- 5. Provide grey resilient parts for exposed bumpers.
- 6. Closures indicated for use on Acoustical Doors and Frames shall allow for a minimum 1/2" updown movement due to the Cam-Lift hinges.
- 7. 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.
- 8. 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.
- 9. 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.
- 10. 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.
- 11. Closers shall be installed to permit doors to swing 180 degrees.
- 12. 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.
- 13. 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.
- 14. 9. Provide sex-bolted or through bolt mounting for all door closers.
- J. Flush Bolts & 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.

K. Door Stops

- 1. Coordinate the installation of backing in walls with the door supplier, aligned with the top and bottom of doors.
- 2. Unless otherwise noted in Hardware Sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
- 3. All Floor Stops shall be installed within four (4) inches maximum from the face of wall, bollard or partition.

4. 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.

L. Protection plates:

- 1. Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws.
- 2. Fabricate edge trim of stainless steel to fit door thickness in standard lengths or to match height of protection plates.
- 3. Fabricate protection plates not more than 1-1/2 inches less than door width on hinge side and not more than 1/2 inch less than door width on pull side by height indicated.
 - a. Protection plates shall be stainless steel, 0.050 inch (18 gage).
- 4. 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.

M. Thresholds:

- 1. Provide standard metal threshold unit of type, size, and profile as shown or scheduled.
- 2. Exterior Doors: Provide units not less than 4 inches wide, formed to accommodate change in floor elevation, fabricated to accommodate door hardware and to fit door frames.
- 3. Thresholds shall not exceed 1/2" in height, with a beveled surface of 1:2 maximum slope.
- 4. Set thresholds in a full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Division 7.
- 5. Use 1/4" fasteners, red-head flat-head sleeve anchors (SS/FHSL).
- 6. Thresholds shall comply with CBC Section 11B-404.2.5.

N. Seals & Silencers:

- 1. Provide continuous weatherstripping on exterior doors and smoke, light, or sound seals on interior doors where indicated or scheduled.
 - a. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.
 - b. Provide silicone gasket at all rated and exterior doors, in accordance with ASTM E 283 "Test method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimum".
- 2. Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.
- 3. Provide silencers for hollow metal frames, 3 for single doors, 2 for pairs of doors.
 - a. Omit where sound or light seals occurs, or for fire-resistive-rated door assemblies.
- 4. Seals: Provide silicone gasket at all rated and EXTERIOR doors.
- 5. Fire-rated Doors, Resilient Seals: UL10C Classified complies with NFPA 80 & NFPA 252. Coordinate with selected door manufacturers' and selected frame manufacturers' requirements.
- 6. 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.
- 7. Smoke & Draft Control Doors, Provide UL10C Classified complies with NFPA 80 & NFPA 252 for use on "S" labeled Positive Pressure door assemblies.
- O. Door Shoes & Door Top Caps: Provide galvanized door shoes at all exterior wood doors and galvanized top caps at all exterior out-swing doors.

P. Fasteners:

1. 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.
- 2. Screws for butt hinges shall be flathead, countersunk, full-thread type.
- 3. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.
- 4. Provide expansion anchors for attaching hardware items to concrete or masonry.
- 5. All exposed fasteners shall have a phillips head.
- 6. Finish of exposed screws to match surface finish of hardware or other adjacent work.
- 7. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

2.4 FINISHES

A. Hardware finishes:

- 1. General:
 - a. All hardware shall be satin chromium (US26D 626) unless otherwise noted.
 - b. Provide 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 shall be finished anodized aluminum (US28 628), except thresholds which can be furnished as standard mill finish.
- 2. Match items to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).
- 3. Provide finishes that match those established by BHMA or, if none established, match Architect's sample.
- 4. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
- 5. Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix "-NL" is used with standard finish designations to indicate "no lacquer".
- 6. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes", including coordination with the traditional U.S. Finishes shown by certain manufacturers for their products.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

- 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
 - a. Verify that doors and frames are square and plumb and ready to receive work and dimensions are as instructed in writing by the manufacturer.
- 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
- 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

- 1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
 - a. Coordinate electrical power needs for those hardware items requiring electrical interface.
 - b. Coordinate electrical alarm needs (security, fire/smoke detection) for those hardware items requiring electrical alarm interface.
- 2. Provide all required hardware templates.

B. Surface preparation:

- 1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
- 2. Coordinate the blocking required for all wall mounted hardware.
- 3. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:

- 1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
 - a. Hardware distributor shall assist and advise installer in correcting field problems arising during installation of hardware.
 - b. Hardware distributor shall be on the Project within 48 hours upon being notified by the Contractor.
 - c. Hardware distributor shall assist installer in the proper adjustment of all door closers, and other operating devices.
- 2. In accordance with approved submittals.
- 3. In accordance with Regulatory Requirements.
- 4. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by the Architect.
 - a. Steel Doors and Frames: "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
 - b. Door opening devices shall be installed at 34" minimum to 44" AFF maximum height per CBC Section 11B-404.2.7.
- 5. Install each hardware item in compliance with the manufacturer's written instructions and recommendations. Where indicated and where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 09 Sections.
 - a. Use the templates provided by hardware item manufacturer.
 - b. Do not install surface-mounted items until finishes have been completed on the substrate involved.
- 6. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- 7. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- 8. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Specification Section SEALANTS.

- 9. Weatherstripping and seals shall comply with manufacturer's written instructions and recommendations to the extent installation requirements are not otherwise indicated.
- 10. Install hardware in accordance with manufacturer's instructions and requirements of DHI.
- 11. If hand of door is changed during construction, make necessary changes in hardware at no additional cost.

B. Coordination with Facility Services:

- 1. Hardware Installer shall coordinate with security contractor to route cable to connect electrified locks, panic hardware and fire exit hardware to power transfers or electric hinges at the time these items are installed so as to avoid disassembly and reinstallation of hardware.
- 2. Hardware Installer shall also be present with the security contractor when the power is turned on for the testing of the electronic hardware applications. Installer shall make adjustments to solenoids, latches, vertical rods and closers to insure proper and secure operation.
- 3. All wiring for electro-mechanical hardware mounted on the door shall be connected through the power transfer and terminated in the interface junction box specified for in the Electrical Section.
- 4. Conductors shall be minimum 18 gage stranded, multicolored. A minimum 12 in. loop of conductors shall be coiled in the interface junction box. Each conductor shall be permanently marked with its function.
- 5. If a power supply is specified in the hardware sets, all conductors shall be terminated in the power supply. Make all connections required for proper operation between the power supply and the electro-mechanical hardware. Provide the proper size conductors as specified in the manufacturer's technical documentation.

3.4 FIELD QUALITY CONTROL

A. Inspection:

- 1. Contractor shall inspect all hardware to assure that it was installed correctly and is in proper working order.
- 2. The Contractor shall schedule an inspection prior to substantial completion, and notify the Owner's Inspector and any regulatory agencies of the time 48 hours prior to the inspection.
 - a. The inspection shall cover checking all locks and verifying that they have been installed in accordance with the hardware schedule and the keying schedule.
- 3. 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) 2016 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.

3.5 ADJUSTING

A. Adjusting:

- 1. Adjust and check each operating item of hardware and each door to ensure proper operations or function of every unit.
 - a. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the

application made.

- Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area.
- 2) Clean operating items as necessary to restore proper function and finish of hardware and doors.
- 3) Adjust door control devices to compensate for final operation of heating and ventilating equipment.

3.6 CLEANING

- A. Clean in accordance with Specification Section PROJECT CLOSEOUT.
 - 1. Clean any soiled surfaces immediately.
 - 2. Finish shall be clean and ready for the application of any additional finishes.

3.7 DEMONSTRATION

- A. In accordance with Specification Section PROJECT CLOSEOUT.
 - 1. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train Owner's maintenance personnel as specified below.
 - a. Provide the services of a factory-authorized service representative to demonstrate and train Owner's maintenance personnel as specified below.
 - 1) Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.

3.8 SCHEDULES

OT W

- A. The items listed in the following schedule shall conform to the requirements of the foregoing specifications.
- B. 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 P	roof
		Strikes, Push Pull & Kick Plates, I	Door Stops &	Silencers
LCN	=	LCN	Door Closers	
LOC	=	Locinox	Gate Closures	
NGP	=	National Guard Products	Thresholds, Gasketing & Weather-stripping	,
PEM	=	Pemko	Thresholds, Gasketing & Weather-stripping	5
SCE	=	Schlage Electronics	Electronic Door Components	
SCH	=	Schlage Lock Company	Locks, Latches & Cylinders	
TRI	=	Trimco	ADA Pocket Door Pulls & Flush Pulls	
VON	=	Von Duprin	Exit Devices	
ZER	=	Zero	Gasketing & Weather-stripping	

INTERIOR AND EXTERIOR LATCH SETS, LOCKSETS & COMMERCIAL LOCKS

HARDWARE GROUP NO. 40 - PRIVACY WITH "OCCUPIED" INDICATOR

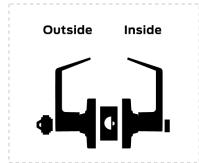
INTERIOR

EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	FACULTY RESTROOM	L9056T 17A L583-363 L283-722	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	SILENCER	SR64	GRY	IVE

Schlage ANSI
ND50PD F82
Entrance/office lock
Push-button locking.
Push-button locks outside

lever until it is unlocked with key or by turning inside lever.



HARDWARE GROUP NO. 50A - OFFICE LOCK - INTERIOR / OFFICE / CONFERENCE

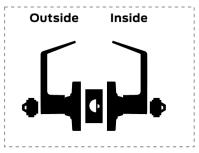
EACH TO HAVE:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ENTRANCE/OFFICE	ND50PD SPA	626	SCH
		LOCK			
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	-	IVE
3	EA	GASKETING	319CN	-	PK

Schlage ANSI
ND75PD -

Classroom security lock

- Key in either lever locks or unlocks outside lever.
- · Inside lever is always unlocked.



HARDWARE GROUP NO. 75 - CLASSROOM SECURITY LOCK - INTERIOR CLASSROOMS

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM SECURITY	ND75TD SPA XN12-035	626	SCH
2	EA	PRIMUS CORE	20-740	626	SCH
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	SILENCER	SR64	GRY	IVE

3/31/2023 2:12 PM

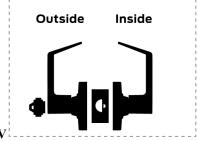
HARDWARE GROUP NO. 75C - CLASSROOM SECURITY LOCK - INTERIOR / CLASSROOM

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM SECURITY	ND75TD SPA XN12-035	626	SCH
2	EA	PRIMUS CORE	20-740	626	SCH
1	EA	FLOOR STOP / HOLDER	FS52 WITH 1268 TRIMCO BASE PLATE	626	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REO	689	LCN

Schlage	ANSI				
ND80PD	F86				
Storeroom lock					
Outside lever is fixed.					

Inside lever always unlocked.

- Entrance by key only.



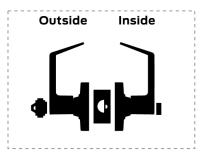
HARDWARE GROUP NO. 80 – STOREROOM LOCK - INTERIOR STORAGE, TECHNOLOGY IDF, EQUIPMENT, JANITOR

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80TD SPA	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18S	BLK	ICE
3	EA	SILENCER	SR64	GRY	IVE

Schlage ANSI

ND85PD
Faculty restroom lock

- Outside lever is fixed.
- Entrance by key only.
- Push-button in inside lever activates visual occupancy indicator, allowing only emergency master key to operate.
- Turn inside lever or close door to release visual occupancy indicator.
- Rotation of inside spinner-button provides lock-out feature by keeping indicator thrown.



HARDWARE GROUP NO. 85 - FACULTY RESTROOM LOCK - INTERIOR / FACULTY RESTROOM

OTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
QII		DESCRIFTION	CATALOG NUMBER	LIMSH	MILK
3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	FAC RESTRM W/IND	ND85PD SPA	626	SCH
		CYL			
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

			HARDWARE		2123
1	EA	FLOOR STOP	FS18S	BLK	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

INTER	INTERIOR AND EXTERIOR PANIC HARDWARE							
HARD	HARDWARE GROUP NO. 99E - EXTERIOR DOOR WITH PANIC HARDWARE :							
QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR			
1	EA	CONT. HINGE	224HD	628	IVE			
1	EA	PANIC HARDWARE	CD-AX-99-NL-OP-110MD-PA	626	VON			
1	EA	RIM CYLINDER	20-057-ICX	626	SCH			
1	EA	MORTISE CYLINDER	20-061-ICX XQ11-948 (DOGGING)	626	SCH			
2	EA	PRIMUS CORE	20-740	626	SCH			
1	EA	DOOR PULL	VR910 NL	630	IVE			
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN			
1	EA	FLOOR STOP / HOLDER	FS42 WITH 1268 TRIMCO BASE	626	IVE			
1	SET	WEATHER SEAL	SUPPLY WITH DOOR AND FRAME					
			ASSEMBLY					
1	EA	THRESHOLD	PER DETAIL					
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE			
NOTE	NOTES:							
1) At H	1) At Hollow Metal Doors and Frames, PROVIDE the following additional hardware:							
1	EA	GASKETING	188S-BK	S-BK	ZER			
1	EA	DOOR BOTTOM	222APK	AL	PEM			

END OF SECTION

SECTION 088000 - GLASS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all glass materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 06 22 00 MILLWORK
 - 4. 07 92 00 SEALANTS
 - 5. 08 11 00 METAL DOORS AND FRAMES
 - 6. 08 34 73 ACOUSTICAL DOORS AND FRAMES
 - 7. 09 91 00 PAINTING
 - 8. 10 05 00 MISCELLANEOUS SPECIALTIES
 - 9. 10 14 00 IDENTIFYING DEVICES
 - 10. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

- 1. In accordance with the following standards:
 - a. AAMA American Architectural Manufacturers Association.
 - b. ANSI American National Standards Institute.
 - c. ASTM American Society for Testing and Materials.
 - d. CSPC Consumer Products Safety Commission.
 - e. FGMA Flat Glass Marketing Association Glazing Manual, 1990 Edition.
 - f. GANA Glass Association of North America
 - g. GTA Glass Tempering Association.
 - h. IGCC Insulating Glass Certification Council.
 - i. LSGA Laminated Safety Glass Association.
 - j. SGCC Safety Glazing Certification Council.
 - k. SIGMA Sealed Insulating Glass Manufacturers Association.

1.3 DEFINITIONS

- A. Manufacturer is used in this Section to refer to a firm that produces primary glazing, fabricated glazing, or both as defined in the referenced glazing standards.
 - Deterioration of Coated Glass: Defects developed from normal use that are attributed to
 the manufacturing process and not to causes other than glass breakage and practices for
 maintaining and cleaning coated glass contrary to manufacturer's written directions.
 Defects include peeling, cracking, and other indications of deterioration in metallic
 coating.

- 2. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed the manufacturing process and not to causes other than glass breakage and improper practices for maintaining, and cleaning insulating glass contrary to manufacturers written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on the interior surfaces of glass.
- 3. f.o.b. "Free On Board".
- 4. Glass Surfaces:
 - a. Single Glazed:
 - 1) Surface #1: exposed to outdoors.
 - 2) Surface #2: exposed to indoors.
 - b. Dual Glazed:
 - 1) Exterior Lite:
 - a) Surface #1: exposed to outdoors.
 - b) Surface #2: faces insulating "air" space. Primary location for energy efficient coatings.
 - 2) Interior Lite:
 - Surface #3: faces insulating "air" space. Secondary location for energy efficient coatings.
 - b) Surface #4: exposed to indoors.

1.4 SYSTEM DESCRIPTION

- A. Performance Requirements: It is the intention of this specification and the drawings to form a guide for a completely sealed glazing system. Any items not specifically noted but necessary for a completely sealed glazing system shall be provided under this section.
 - 1. Provide glazing systems that are produced, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading (where applicable), without failure, including loss or glazing breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; and other defects in construction.
 - 2. Glass Design: Glass thickness indicate minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for the various size openings in the thicknesses and strengths (annealed or heat-treated) to meet or exceed the following criteria:
 - a. Minimum glass thickness for lites in exterior walls shall be not less than 6.0mm (1/4" nom.).
 - 3. Thermal Movement: Provide glazing that allows for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures acting on glass-framing members and glazing components. Base engineering calculation on material's actual surface temperatures due to both solar heat gain and nighttime sky heat loss.
 - a. Temperature Change Range: 120 deg F, ambient; 180 deg F, material surfaces...

1.5 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Coordination Drawings:
 - a. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.
 - 2. Product Data.

- a. Submit manufacturer's product data for each glazing product and accessory material indicated.
- 3. Samples.
 - a. Provide 12 inch square sample of each glass type, color and pattern selected.
 - b. Provide 6 inch square samples of insulated glazing panels for each glazing type and pattern selected.
 - c. Provide 12 inch long samples of each type of glazing sealant, gasket or glazing tape. Install sealant or glazing material sample between two strips of material representative in color of the adjoining framing system.
- 4. Quality Assurance/Control Submittals:
 - a. Test Reports:
 - 1) Compatibility and Adhesion Test: From sealant manufacturer indicating that glazing sealants were tested for adhesion to glass and glazing channel substrates and compatibility with glass and other glazing material.
 - b. Certificates:
 - 1) Contractor's Certification.
 - 2) Qualification Data:
 - a) Material Qualifications.
 - b) Installer Qualifications.
 - c) Manufacturer/Supplier Qualifications.
 - 3) Product Certificates:
 - a) Fire-Resistive Ceramic Glazing materials.
 - c. Manufacturer's Written Instructions:
 -) Manufacturer's written installation instructions for all products.
- 5. Closeout Submittals in accordance with the following:
 - Maintenance Data in accordance with Specification Section PROJECT CLOSEOUT.
 - b. Record Documents in accordance with Specification Section RECORD DOCUMENTS.
 - c. Warranty in accordance with Specification Section WARRANTIES.
 - 1) Special Warranties:
 - a) Coated Glass Products.
 - b) Laminated Glass Products.
 - c) Insulated Glass Products.
 - d) Insulated Glazing Products.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Material Qualifications:
 - a. Comply with published recommendations of glazing product manufacturers and organizations listed, except where more stringent requirements are indicated.
 Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - b. Obtain glazing from one source for each product indicated.
 - 2. Installer Qualifications:
 - a. An experienced Installer who has completed three (3) projects similar in materials, design and extent to that indicated for this Project; whose work has resulted in glass installation with a record of successful in-service performance..
 - 3. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:

- 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. All glazing shall comply with provisions of CBC Chapter 24 for quality standards and CBC Section 2403.1 for identification.
 - c. All glazing subject to Hazardous Locations shall comply with Safety Glazing Requirements and CBC Chapter 2406.

C. Certificates:

- 1. Contractor's Certification: Provide a letter on Contractor's Letterhead certifying work provided, meets or exceeds, the Code Minimum requirements, and the other specified requirements of this Section.
- 2. Qualification Data: Contractor's installation certificates.
- 3. Product Certificates: Glazing materials manufacturers certifying that their products comply with specified requirements.
- 4. Fire-Resistive Ceramic Glazing materials certification that products comply with CPSC Requirements.

D. Meetings:

- 1. Pre-Installation: Schedule prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 - c. Pre-glazing conference: Scheduled by the Contractor prior to the start of any glazing operation for the proper performance of the work.
 - 1) Minimum agenda shall be to review the work required; discuss field observations, problems, and decisions; corrective measures if necessary; and maintenance of quality and work standards in accordance with manufacturer's warranty requirements.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintaining installed work until the Notice of Substantial Completion has been executed.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 - 1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
 - a. Protect glazing materials to comply with manufacturer's written directions and as needed to prevent damage to glazing and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

2. Where insulating glass units will be exposed to substantial altitude changes, comply with insulating glass fabricator's recommendations for venting and sealing to avoid hermetic seal ruptures.

B. Acceptance at Site:

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

C. Storage and Protection:

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

1.8 PROJECT CONDITIONS

A. Environmental Requirements:

- 1. Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing materials manufacturer or when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - a. Do not install liquid sealants when ambient and substrate temperature conditions are outside of limits by glazing sealant manufacturer or below 40 deg F.

1.9 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty.
 - 2. Manufacturer's Warranty on Coated Glass Products:
 - a. Submit written warranty signed by coated glass manufacturer agreeing to replace coated glass units that deteriorate as defined in "Definitions" article, f.o.b. the nearest shipping point of Project Site, within specified warranty period.
 - b. Warranty Period: Five (5) Years.
 - 1) From date of Substantial Completion.
 - 3. Manufacturer's Warranty on Insulating Glass Products:
 - a. Submit written warranty signed by manufacturer of insulating glass agreeing to replace insulating glass units that deteriorate as defined in "Definitions" article, f.o.b. the nearest shipping point of Project Site, within specified warranty period.
 - b. Warranty Period: Ten (10) Years.
 - 1) From date of Substantial Completion.

C. Installer's Warranty:

- 1. In accordance with the terms of the Specification Section WARRANTIES:
 - a. Warranty period One (1) Year.
 - 1) From date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified Annealed Float Glass product manufacturer, or approved equivalent:
 - a. Class 1 materials:
 - 1) VITRO ARCHITECTURAL GLASS (formerly PPG INDUSTRIES, INC.).
 - 2) Acceptable Alternative Class 1 Manufacturers:
 - a) AFG INDUSTRIES, INC.
 - b) CARDINAL GLASS INDUSTRIES.
 - c) GUARDIAN INDUSTRIES CORPORATION
 - d) PILKINGTON SALES (NORTH AMERICA) LTD.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. General:

- 1. All glazing shall comply with all provisions of CBC Chapter 24.
 - a. Provide the required strength of glazing to comply with the area limitation set forth in CBC Table 2403.2.1 for individual lites.
- 2. Refer to the Glass Schedule of this section for the class of each Glazing Type.
- 3. Refer to the Insulating Glazing Panel Schedule of this section for the class of each Insulated Glazing Panel Type.
- B. Annealed Float Glass: ASTM C 1036 "Specification for Flat Glass," Type I, and ASTM C 1048 "Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass," Type (transparent glass, flat), Quality q3 (glazing select), of Class indicated.
- C. Heat-Treated Float Glass: ASTM C 1048 "Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass," Type I (transparent glass, flat), Quality q3 (glazing select), of class, kind and condition indicated.
 - 1. Fabrication Process: By vertical (tong-held) or horizontal (roller-hearth) process, at manufacturer's option, except provide horizontal process where indicated as tongless or free of tong marks.
 - 2. Provide Kind HS (Heat-Strengthened) float glass in place of annealed float glass where needed to resist thermal stresses indicated by differential shading of individual glass lites and to comply with glass design requirements.
 - 3. Uncoated Glass: Comply with the requirements for Condition A.
 - 4. Coated Glass: Comply with the requirements for Condition C.
 - 5. Tempered: Provide Kind FT (Fully Tempered) float glass in place of annealed or Kind HS (Heat Strengthened) float glass where safety glass is indicated.

2.3 ACCESSORIES

A. Elastomeric Glazing Sealants:

- 1. General: Provide products of type indicated, complying with the following requirements:
 - a. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials they will contact, including glazing products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
 - b. Suitability: Comply with sealant and glazing manufacturer's written recommendations for selecting glazing sealants and tapes that are suitable for applications indicated and conditions existing at time of installation.
 - c. Colors: Provide color of exposed joint sealants to comply with the following:
 - 1) Match colors indicated by reference to manufacturer's standard designations.
 - 2) Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.
- 2. Standard: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with ASTM C 920 "Specification for Elastomeric Joint Sealants," requirements indicated in Specification Section SEALANTS, including those referencing ASTM classifications for Type, Grade, Class and Uses.

B. Glass Tapes:

- 1. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent, non-staining and non-migrating in contact with nonporous surfaces, with or without spacer rod as recommended in writing by tape and glazing manufacturers for application indicated, packaged on rolls with a release paper backing, and complying with ASTM C 1281 "Specification for Preformed Tape Sealants for Glazing Applications," and AAMA 800 "Voluntary Specifications and Test methods for Sealants" for products indicated below:
 - a. AAMA Section 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

C. Miscellaneous Glass Materials:

- 1. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glass materials involved for glass application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- 2. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.
- 3. Setting Blocks: Elastomeric material with a Shore Type A durometer hardness of 85 plus or minus 5.
- 4. Spacers: Elastomeric blocks or continuous extrusions with a Shore Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- 5. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side-walking).
- 6. Plastic Foam Joint Fillers: Pre-formed, compressible, resilient, nonstaining, nonextruding, nonoutgassing, strips of closed-cell plastic foam of density, size, and shape to control sealant depth and otherwise contribute to produce optimum sealant performance.
- 7. Perimeter Insulation for Fire-Resistive Glass: Identical to product used in test assembly to obtain fire-resistive rating.

2.4 FABRICATION

- A. Fabricate glass and other glass products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instruction and recommendations of product manufacturer and referenced glazing standard, to comply with system performance requirements.
- B. Clean cut or flat grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with indoor and outdoor faces.
- C. Grind smooth and Polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

- 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.
 - a. Examine glass framing, with glazier present, for compliance with the following:
 - 1) Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
 - 2) Presence and functioning of weep system for aluminum framing systems, and proper sealing of hollow metal frame systems with no weep systems.
 - 3) Minimum required face or edge clearances.
 - 4) Effective sealing between joints of glass-framing members.
- 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
- 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

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

B. Protection:

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

C. Surface preparation:

- 1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
- 2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
- 3. Clean glass channels and other framing members receiving glass immediately before glazing.
- 4. Remove coatings that are not firmly bonded to substrates.

5. Wipe down any mirror backing with alcohol before applying mirror adhesives.

3.3 INSTALLATION

A. Glass, General:

- 1. Comply with installation standards of CBC Chapter 24.
 - a. Glass subject to human impact shall be installed in accordance with CBC 2406.
- Comply with combined written instructions and recommendations of manufacturers of glass, insulated glass panels, sealants, gaskets, and other glass materials, except where more stringent requirements are indicated, including those in referenced glazing publications.
- 3. Glass channel dimensions, as indicated on Drawings, provide necessary bite on glazing, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- 4. Protect glass from edge damage during handling and installation as follows:
 - a. Use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass lites with flares or bevels on bottom horizontal edges so edges are located at top of opening, unless otherwise indicated by manufacturer's label.
 - b. Remove damaged glass from Project site and legally dispose of off site. Damaged glass is glass with edge damage or other imperfections that, when installed, weaken glass and impair performance and appearance.
- 5. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- 6. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing standard, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- 7. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- 8. Provide spacers for glass sizes larger than 50 united inches (length plus height) as follows:
 - a. Locate spacers inside, outside, and directly opposite each other. Install correct size and spacing to preserve required face clearances, except where gaskets and glass tapes are used that have demonstrated ability to maintain required face clearances and comply with system performance requirements.
 - b. Provide 3.0mm (1/8" nom.) minimum bite of spacers on glass and use thickness equal to sealant width. With glass tape, use thickness slightly less than final compressed thickness of tape.
- 9. Provide edge blocking to comply with requirements of referenced glazing publications, unless otherwise required by glass manufacturer.
- 10. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

B. Tape Glazing:

- 1. Position tapes on fixed stops so that when compressed by glass their exposed edges are flush with or protrude slightly above sight-line of stops.
 - a. Slightly recess tape at exterior conditions, and continuously cap bead with elastomeric sealant leaving no open joints.
- 2. Install tapes continuously but not in one continuous length.
 - a. Do not stretch tapes to make them fit opening.
- 3. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs.
- 4. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.

- 5. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped.
- 6. Do not remove release paper from tape until just before each lite is installed.
- 7. Seal joints in tapes with compatible sealant approved by tape manufacturer.
 - a. Apply continuous heal bead of elastomeric sealant at all exterior hollow metal framing stops.
 - b. Install a continuous toe bead of elastomeric sealant at all exterior hollow metal framing stops on installations with Laminated Glass, Wire Glass or Insulated Glazing Panels.
 - c. Apply continuous cap bead of elastomeric sealant over exposed edge of tape.
- 8. Install tapes on all fixed and loose stops.

C. Sealant glazing (Wet):

- Install continuous spacers between glass lites and glass stops to maintain glass face clearances and to prevent sealant from extruding into glass channel weep systems (if any) until sealants cure.
 - a. Secure spacers in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- 2. Force sealant into glass channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- 3. Tool exposed surfaces of sealants to provide a substantial wash away from glass.
 - a. Install pressurized gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.

3.4 CLEANING

- A. Clean in accordance with Specification Section PROJECT CLOSEOUT.
 - 1. Wash glass on both faces in each area of Project not more than 4 days prior to date scheduled for inspections that establish date of Substantial Completion.
 - a. Wash glass as recommended in writing by glazing manufacturer.

3.5 PROTECTION

A. Protection from traffic:

- 1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.
- 2. Protect exterior glass from breakage immediately after installation by attaching crossed streamers to framing held away from glass.
 - a. Do not apply markers to glass surface.
 - b. Remove nonpermanent labels, and clean surfaces.
- 3. Protect glass from contact with contaminating substances resulting from construction operations including weld splatter.
 - a. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended in writing by glass manufacturer.
- 4. 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 build-up of dirt, scum, alkali deposits, or stains, and remove as recommended in writing by glass manufacturer.
- 5. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents and vandalism, during construction period.

3.6 SCHEDULES

- A. Glass Schedule:
- B. "C" -- Clear Float Glass:
 - C1-1T -- Tempered Clear Float, Class 1, manufactured by VITRO ARCHITECTURAL GLASS:
 - a. Thickness 6.00 mm (Approx. 1/4" nominal).
 - b. Minimum Visible Light (%) Transmittance 89
 - c. Solar Heat Gain Coefficient (SHGC) 0.81.
 - d. "U" Factor:
 - 1) Winter Night-time 1.03.
 - 2) Summer Daytime 0.93.
 - 2. C2-2T -- Tempered Clear Float + Clear Float:
 - a. Thickness 25.00 mm (1" nominal).
 - b. Insulated Glazing Unit System:
 - 1) Outdoor Lite: 1/4" Clear Float.
 - a) Heat Treated, per ASTM C1048 Kind FT.
 - b) Surface #2 Coating SN 54.
 - 2) Interspace: 1/2 Inch.
 - a) Spacer Material: Manufacturer's standard.
 - b) Content: Air.
 - 3) Indoor Lite: 1/4" Clear Float
 - a) Heat Treated, per ASTM C1048 Kind FT.
 - c. Visible Light Transmittance 54.
 - d. Solar Heat Gain Coefficient (SHGC).. 0.28.
 - e. "U" Factor:
 - 1) Winter Night-time 0.29.
 - 2) Summer Daytime 0.27.

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 092400 - CEMENT PLASTER

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Cement Plaster materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS
 - 3. 03 30 00 CAST-IN-PLACE CONCRETE
 - 4. 06 10 00 ROUGH CARPENTRY
 - 5. 05 12 00 STEEL AND FABRICATIONS
 - 6. 07 21 00 INSULATION
 - 7. 07 60 00 SHEET METAL
 - 8. 07 92 00 SEALANTS
 - 9. 08 11 00 METAL DOORS AND FRAMES
 - 10. 08 31 13 ACCESS DOORS AND FRAMES
 - 11. 08 33 00 COILING DOORS
 - 12. 09 30 00 TILE
 - 13. 09 50 00 ACOUSTICAL CEILINGS
 - 14. 09 65 10 RESILIENT BASE AND ACCESSORIES
 - 15. 09 91 00 PAINTING
 - 16. 10 05 00 MISCELLANEOUS SPECIALTIES
 - 17. 10 14 00 IDENTIFYING DEVICES
 - 18. 10 28 13 TOILET ACCESSORIES
 - 19. 10 44 00 FIRE PROTECTION SPECIALTIES
 - 20. 10 51 13 METAL LOCKERS
 - 21. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

- 1. In accordance with the following standards:
 - a. AAMA American Architectural Manufacturers Association
 - b. ASTM American Society of Testing Materials
 - c. FS Federal Specification
 - d. ML/SFA Metal Lath / Steel Framing Association a Division of NAAMM.
 - e. NAAMM National Association of Architectural Metal Manufacturers.
 - f. PDSM Plaster and Drywall Systems Manual, ©1988 by BNI and McGraw-Hill, Inc., Third Edition.
 - g. SSMA Steel Stud Manufacturer's Association.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data:
 - a. Manufacturer's Data for each type of product specified.
 - b. Submit manufacturer's standard color range for selection by the Architect.
 - c. Manufacturer's full color range (including any standard, premium and custom colors) of integral color plaster mixes for selection.
 - d. Manufacturer's ICC ES Evaluation Reports (ESR) for fasteners as required.
 - 2. Shop Drawings:
 - a. Show location of all metal accessories: expansion joints, control joints, casing beads, corner reinforcements, separation screeds and reglets.
 - b. Provide installation details of flashings at various types of penetrations, all metal accessories, metal lath, and integration with other related work.
 - 3. Samples:
 - a. 24 inch square field sample of each Cement Plaster Finish prepared on rigid backing for selection.
 - 1) Cement Plaster Finish of each pattern and texture selected prior to paint coat.
 - Cement Plaster Finish of each pattern and texture for each color with type of paint coating selected. Coordinate with Specification Section – PAINTING.
 - b. 6 inch lineal samples of each piece of specified Metal Accessory material as required for the project.
 - 4. Quality Assurance/Control:
 - a. Installer's experience.
 - b. Manufacturer's certification of Installers.
 - c. Manufacturer's installation instructions.
 - d. Water Tightness Test Reports.
 - e. Manufacturer's Field Reports:
 - 1) Confirm mixing and installation procedures of proprietary mixes for all coats of the cement plaster system were within manufacturers requirements.
 - f. Tension Testing Reports.
 - 5. Closeout Submittals in accordance with the following:
 - a. In accordance with Specification Section PROJECT CLOSEOUT.
 - b. Warranty in accordance with Specification Section WARRANTIES.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Material Qualifications:
 - a. Proprietary systems data sheets shall include design properties of each product.
 - 2. Installer Qualifications:
 - a. Installer shall be experienced and shall have successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - b. Shall participate in a mock-up installation that was successfully tested for water tightness.
 - c. Manufacturer of proprietary products shall provide written certification that the Installer is qualified to install manufacturer's systems in accordance with manufacturer's warranty requirements.
 - 3. Manufacturer/Supplier Qualifications:

a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:

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

C. Field Samples:

- 1. Provide Field Samples for approval prior to the application of the cement plaster coats.
- 2. Field Samples shall be panels of a complete installation, representing each of the finish textures and colors from the approved submittal samples.
 - a. The field samples shall be done by the installers for the project.
 - b. The approved field samples shall establish the acceptable standards for all subsequent work.
- 3. When it is the Contractor's intent to incorporate the approved sample panels into the finish Project, the panels shall be located in an area relatively obscured from general view.

D. Mock-Ups:

- 1. Provide mock-up panels prior to application of cement plaster work and prior to installation of any exterior wall cavity and interior materials.
- 2. Mock-Up Assemblies:
 - a. Mock-Ups shall be at exterior wall assemblies and shall integrate all other related work assemblies, including but not limited to, each type of wall openings, wall/eave interface, wall sill, parapet cap, various types of penetrations, material transitions and shall be representative of the intended end-use configuration.
 - 1) Mock-Ups shall be a minimum overall size of 10'-0" wide x 8'-0" high.
 - b. Mock Ups will be used for establishing construction sequence, installation requirements of materials, and creating water tight assemblies without the cement plaster coats.
 - c. Mock Ups may become part of the completed Work upon successful testing for water tightness.

3. Installation:

- a. The Project Inspector, the Architect, Contractor's Superintendent and Sub-contactor's Superintendent shall observe the installation of materials.
- b. Installation crew for the Mock-Ups shall be the installers of the Cement Plaster Systems for this project and installers, as necessary, of other related work assemblies.
- Mock Ups shall include the installation of water barriers, penetration flashing,
 Metal Accessories, Metal Lath, and other related work flashings and materials.
- d. Failed Mock Ups shall be removed and the assembly reinstalled until the water tightness test is successful.

E. Meetings:

- 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with all other related work.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
- 2. Progress: Scheduled by the Contractor during the performance of the work.

- a. Review for proper installation of work progress.
- b. Identify any installation problems and acceptable corrective measures.
- c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 - 1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
- B. Acceptance at Site:
 - 1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
 - 2. Damaged products will not be accepted.
- C. Storage and protection:
 - 1. Store materials inside and under cover on a level platform, six (6) inches above ground, to allow air circulation.
 - a. Keep dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes.

1.6 PROJECT CONDITIONS

- A. Environmental requirements:
 - 1. Temperature: No plastering shall be done under unsuitable conditions of weather or temperature.
 - a. Exterior: No plastering shall be done when prevailing temperature is 40 degrees F. or less for the preceding 24 hours prior to plastering, during the plaster operations, and for at least 48 hours after the set of each plaster coat.
 - 1) Apply and cure plaster to prevent plaster drying out during the curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
 - b. Factory-Prepared Finishes: Comply with manufacturers written recommendations for the environmental conditions for application of finishes.

B. Existing Conditions:

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

1.7 WARRANTY

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

- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Water Barriers:
 - a. Building Wrap (also qualifies as an "Air Barrier"):
 - 1) DuPONT COMPANY.
 - 2) TYPAR.
 - b. Sealing Tape:
 - 1) DuPONT COMPANY.
 - 2) Acceptable alternative manufacturers:
 - a) CANTECH INDUSTRIES.
 - b) 3M COMPANY.
 - c) TYPAR.
 - c. Building Paper:
 - 1) FORTIFIBER CORP.
 - 2. Penetration Flashing:
 - a. GRACE CONSTRUCTION PRODUCTS.
 - b. Acceptable alternative manufacturers:
 - 1) FORTIFIBER.
 - 3. Expanded Metal Lath:
 - a. CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
 - b. Acceptable alternative manufacturers:
 - 1) ALABAMA METAL INDUSTRIES CORPORATION (AMICO).
 - 2) CEMCO.
 - 4. Wire Fabric Lath:
 - a. Woven Wire Fabric Lath:
 - 1) GEORGETOWN WIRE COMPANY
 - 2) Acceptable alternative manufacturers:
 - a) DAVIS WIRE COMPANY.
 - b) JAENSON WIRE COMPANY.
 - b. Welded Wire Fabric Lath:
 - 1) STRUCTA WIRE COMPANY, INC.
 - 5. Metal Accessories:
 - a. Galvanized Metal Plaster Accessories:
 - 1) CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).

- 2) STOCKTON PRODUCTS (SP).
- 3) Acceptable alternative manufacturers:
 - a) ALABAMA METAL INDUSTRIES CORPORATION (AMICO).
 - b) CEMCO.
- b. Aluminum Plaster Accessories:
 - 1) FRY REGLET CORPORATION.
 - 2) Acceptable alternative manufacturers:
 - a) FLANNERY, INC.
 - b) PITTCON.
- c. Fastener:
 - 1) FLANNERY, INC.
- 6. Lath Fasteners:
 - a. Screw Anchors:
 - 1) POWERS FASTENERS "TAPPER +".
- 7. Furring Wads for Screws:
 - 1) FLANNERY TRIM INC. "FURRING WADS".
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Cement Plaster System:
 - 1. Line Wire: Galvanized steel wire, in accordance with ASTM A 641 "Specification for Zinc-Coated (Galvanized) Carbon Steel Wire."
 - a. Minimum 18 gage (0.0475 inch).
 - 2. Water Barriers: Water-Resistive Barriers shall be in accordance with CBC Sections 1404.2 and 2510.6:
 - a. Building Wrap (also qualifies as an "Air Barrier"): Woven and non-woven polyolefin sheets approved per ICC ES Reports for Water-Resistive Barriers for buildings of any construction type and equivalent to Grade D paper with 60 minute water-resistant rating.
 - 1) "Tyvek® Commercial Wrap" by DuPONT COMPANY.
 - b. Sealing Tape (3" wide minimum):
 - 1) "Tyvek® Housewrap Tape" by DUPONT COMPANY.
 - 2) Acceptable alternative manufacturer:
 - a) "Clipper Tape" by CANTECH IND.
 - b) "8086 Construction Sheathing Tape" by 3M.
 - c. Building Paper:
 - Number 15 Asphalt-Saturated felt complying with Type I felt in accordance with ASTM D226 "Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing."
 - 2) Asphalt-Saturated Kraft Waterproof Building Paper approved per ICC ES Reports for Water-Resistive Barriers for buildings of any construction type and equivalent to Grade D paper with 60 minute water-resistant rating.
 - 3. Penetration Flashing: Self-adhered and self-healing weather barrier strips, in accordance with FS UU-B-790a, Grade A.
 - a. 40 mil. minimum thickness, in 9-inch and 12-inch widths as is appropriate for barrier application.
 - 1) "VYCOR V40" by GRACE CONSTRUCTION PRODUCTS.
 - 2) Acceptable alternative manufacturer:
 - a) "Fort-I-Flash 40" by FORTIFIBER

- b) "FlexWrap" and "StraightFlash" by TYVEK.
- 4. Metal Accessories: Zinc Alloy, Aluminum or Hot-Dipped Galvanized Steel, G-60 minimum (Coordinate depth of trim and accessories with the thicknesses and number of plaster coats).
 - a. Control Joints:
 - 28 gage galvanized steel, depth as required, AMICO No. "GripLock J Control Joint."
 - b. Casing Bead:
 - 1) 26 gage galvanized steel, 1-1/2" x depth as required, CDBS No. 66, Short Flange Casing Bead.
 - c. Corner Reinforcement:
 - 1) Outside Reinforcements:
 - a) 26 gage galvanized steel, depth as required, CDBS #1A, Expanded Flange.
 - 2) Inside Joints:
 - a) 28 gage galvanized steel, depth as required, CDBS #30 Construction Control Joint.
 - d. Drip Mold:
 - 1) 24 gage galvanized steel, 2-3/4" x depth as required, SP BSS Blind Spot #10 Drip.
 - e. Vents:
 - 1) 26 gage galvanized steel, 3" x depth as required, SP SBS Bug Stop Vent.
 - 2) 26 gage galvanized steel, 3" x depth as required, SP SES Ember Stop Soffit Vent.
 - f. Foundation Sill Screed: 3-1/2 inch minimum vertical attachment flange per CBC Section 2512.1.2.
 - 1) 26 gage galvanized steel, 3-1/2" x depth as required, CDBS #FHA7 Foundation Sill Screed, with weep holes.
 - g. Weep Screed:
 - 1) 26 gage galvanized steel, 1-1/2" x depth as required with weep holes, CDBS #66 Short Flange Casing Bead, with weep holes.
 - h. Special Trim Shapes, minimum 0.025 extruded aluminum alloy 6063:
 - 1) Channel Screeds, Reveal Moldings, & Screeds by FRY REGLET:
 - a) Provide specific shapes as shown on the Drawings.
 - b) Provide manufacturer's standard channel screed "+," "T," "L," and "corners," factory fabricated intersections as required for channel screeds, reveal moldings and screeds.
 - c) Provide manufacturer's standard flashing connectors between straight runs and intersections.
 - d) Butt Joints shall be flush and align with other metal accessories.
 - e) Provide End Caps compatible for all channel screeds, reveal moldings, and screeds that terminate at opening frames and other construction.
 - f) All finishes shall be "Special Anodic Coating" clear color.
 - i. Single Point Separation Screed:
 - 1) 26 gage galvanized steel, Expanded Metal Base x depth as required, SP PBS Pointed Base Screed with Keyholes.
 - j. Stucco Reglet: 26 gage galvanized steel:
 - 1) 2-1/2-inch flange by FRY REGLET "STX" Series.
 - 2) 1-3/4 inch flange by FRY REGLET "ST" Series.
 - 3) Accessories: Factory manufactured mitered and sealed corners, and polyvinyl chloride "Vinylok" flashing retainer clips.
- 5. Metal Lath:

- a. Expanded Metal Lath: Galvanized steel in accordance with ASTM C 847 "Standard Specification for Metal Lath."
 - 1) "Diamond Mesh" Lath, 3.4 pounds per square yard.
 - 2) "Hi Rib" Lath, 3/8 inch rib, 3.4 pounds per square yard.
 - 3) "Self-Furred Diamond Mesh" Lath, 3.4 pounds per square yard.
- b. Wire Fabric Lath:
 - 1) Woven: Galvanized steel in accordance with ASTM C 1032,
 "Specification for Woven Wire Plaster Base," and ASTM C 1066
 "Specification for Installation of Lath and Furring to Receive Interior and Exterior Portland Cement-Based Plaster."
 - a) 1-1/2 inch x 17 gage (0.0540 inch) hexagon shaped mesh, 1.86 lbs. per square yard.
 - b) "Paper Backed" Woven Wire Fabric Lath and "Self-Furring" Woven Wire Fabric Lath are not acceptable.
 - Welded: Galvanized steel in accordance with ASTM C 933 "Specification for Welded Wire Lath," and ASTM C 1066 "Specification for Installation of Lath and Furring to Receive Interior and Exterior Portland Cement-Based Plaster."
 - a) 1-1/2 inch x 1-1/2 inch x 17 gage (0.0625 inch) square shaped mesh, 1.14 lbs. per square yard.
 - b) "Paper Backed" Welded Wire Fabric Lath is not acceptable.
 - c) "Self-Furring" Welded Wire Fabric Lath without paper backing shall be acceptable.
- 6. Cement Plaster:
 - a. Cement: Type I or II Portland Cement
 - 1) In accordance with ASTM C 150 "Standard Specification for Portland Cement."
 - b. Plastic Cement: Type M or S.
 - 1) In accordance with ASTM C 1328 "Standard Specification for Plastic (Stucco) Cement."
 - c. Miracle Lime: Type S.
 - In accordance with ASTM C 206 Standard Specification for Finishing Hydrated Lime."
 - d. Sand: Clean and washed sand complying with ASTM C 897 "Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters."
 - 1) Grading:

U.S.		CUMULATIVE WEIGHT	PERCENT RETAINED
STANDARD		MINIMUM	MAXIMUM
SIEVE			
NO.	4		0
NO.	8	0	10
NO.	16	10	40
NO.	30	30	65
NO.	50	70	90
NO.	100	95	100
NO.	200	97	100

- 2) Finish Coat Sand: Washed, white silica sand, a.k.a. "Monterey Sand."
- e. Surface Applied Liquid Bonding Agent: Resinous emulsion with the following minimum requirements:
 - 1) Minimum tensile strength of 60 psi.
 - 2) Minimum compressive shear strength of 300 psi.

2.3 ACCESSORIES

- A. Fasteners: Shall be in accordance with ASTM C 1063, "Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster".
 - 1. Staples: 16 gage, galvanized steel.
 - a. In accordance with ASTM E1667 "Standard Specification for Driven Fasteners, Nails, Spikes and Staples."
 - b. Provide 1/4 inch furring wads at staple attachments for lath.
 - 2. Nails: galvanized steel.
 - a. In accordance with ASTM E1667 "Standard Specification for Driven Fasteners, Nails, Spikes and Staples."
 - b. Minimum, 7/16 inch (0.437 inch) diameter head and 11 gage (0.1205 inch) barbed, roofing or common nails.
 - c. Provide 1/4 inch self-sealing furring wads at nail attachments for lath.
 - d. Tie Nails: 10d galvanized nails.
 - e. Concrete Stub Nails: Corrosion Resistant.
 - 1) Minimum, 3/8 inch wide head.
 - 3. Screws at Wood Framing: Corrosion Resistant.
 - a. In accordance with ASTM C 1002 "Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs."
 - 1) Minimum 7/16 inch (0.437 inch) diameter pan wafer head and a 0.163 inch (#8) diameter shank with sharp-point.
 - b. Provide 1/4 inch furring wads at screw attachments for lath.
 - 4. Power or Powder Actuated Fasteners:
 - a. In accordance with ASTM E 488 "Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements."
 - b. Size: min. 3/8 inch wide heads with 0.145 inch shank diameter, in length as required to achieve specified penetration.
 - c. Corrosion Resistant.
 - 5. Screw Anchor Fasteners:
 - a. In accordance with ASTM E 488 "Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements."
 - b. In accordance with valid ICC ESR testing applicable to installation conditions.
 - c. Size: 3/16 inch diameter, in length as required to achieve specified penetration.
 - d. Corrosion Resistant.
 - e. Accessories for Screw Anchor Fasteners:
 - Matched tolerance drill bit, dust removal device, and other accessories in accordance with written manufacturer's instructions and ICC ES Evaluation Report.
 - 6. Wires:
 - a. Galvanized (Class 1 zinc coating) soft temper steel wire, in accordance with ASTM A 641, "Specification for Zinc-Coated (Galvanized) Carbon Steel Wire."
 - b. All wire diameters specified are uncoated and corresponds with United States Steel Wire Gauge (USSWG):

Member to Member: Minimum 16 gage (0.0625 inch).
 Lath to Support Member: Minimum 18 gage (0.0475 inch).
 Lath to Metal Accessories: Minimum 18 gage (0.0475 inch).
 Lath to Lath: Minimum 18 gage (0.0475 inch).

- B. Open Corner Reinforcement:
 - 1. Cement Plaster: Expanded Metal Lath, AMICO "Cornalath" galvanzied steel.

2.4 MIXES

- A. Cement Plaster Mixes: Shall be in accordance with ASTM C 926 "Specification for Application of Portland Cement-Based Plaster."
 - 1. Scratch Coat Mix (No additions of plasticizing agents allowed):
 - a. One half part Common Cement.
 - b. One half part Plastic Cement.
 - c. Four parts Sand.
 - 2. Brown Coat Mix (No additions of plasticizing agents allowed):
 - a. One half part Common Cement.
 - b. One half part Plastic Cement.
 - c. Five parts Sand.
 - 3. Finish Coat Mix:
 - a. Exterior Cement Plaster (No additions of plasticizing agents allowed):
 - 1) One part Common Cement.
 - 2) One part Miracle Lime.
 - 3) Three parts Finish Coat Sand.
 - a) Sieve Size: (20 60).

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Coordination:
 - 1. Coordinate work under this specification section with all related work specified under other sections to ensure proper and adequate interface of work.
 - a. Verify and locate framing and or backing necessary for proper installation of cement plaster system.
 - 2. Integrate Water barriers and Penetration Flashing with all flashings from all other related work for proper shedding of water out of the building.
 - 3. Protection:
 - 4. Project Inspector shall verify that all stud cavity walls are free of moisture and dry prior to any other construction that fully closes the wall cavity.
 - 5. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
 - a. Provide temporary protections and enclosures for other work.

B. Surface preparation:

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

3.3 INSTALLATION

A. General:

- 1. It is the intent to provide a weather resistant exterior plaster system envelope upon completion.
 - a. Overlap and shingle fashion all substrate barriers, papers and penetration flashing with accessories in such a way as to shed water at the midpoint flashing (i.e. floor juncture flashing, or head flashing at openings and penetrations), or allow it to weep to drainage weep holes at the foundation sill screed in accordance with the requirements of the CBC Section 1403 and 1404.2.
- 2. In accordance with ASTM C 1063, "Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster" and ASTM C 926, "Application of Portland Cement-Based Plaster."
 - a. In accordance with CBC Chapter 7, Chapter 7A, Chapter 14, and Chapter 25.
 - b. In accordance with listed UL Assemblies at designated fire rated assemblies.
 - c. In accordance with "The Plaster and Drywall Systems Manual" (PDSM).
 - d. In accordance with Regulatory Requirements.

B. Layout:

- a. Set plumb, level, and square.
- b. Lines of all Metal Accessories shall be straight and true. Set accessories to create a cement plaster finish plane within a tolerance of 1/8 inch in 10 feet.
- c. Apply all Brown and Finish Coats of plaster to create a finish plane with a tolerance of 1/8 inch in 10 feet.

C. Installation of Line Wire:

- 1. Apply Line Wire prior to the placement of the water barriers.
- 2. Line Wire shall be installed at open framing of exterior vertical assembly.
- 3. Install Line Wire perpendicular to the framing members at 6" on center and secured to every fourth framing member with a screw.
 - a. Stretch Line Wire sufficiently tight to minimize bulging of the Water Barriers and to ensure a uniform thick scratch coat.

D. Installation of Water Barriers:

- 1. Install Water Barriers after installation of Line Wire at open framing.
- 2. Water barriers shall be installed at all exterior walls, exterior soffits, and at interior walls considered to be "Semi-Wet" and "Wet" exposures (i.e. Toilets, Showers, Lockers, Kitchens and etc.).
- 3. Install Water Barriers with Penetration Flashing, Metal Accessories, and all other related work in "shingle" or "weatherboard" fashion.
- 4. Water Barriers shall be installed as required in CBC Sections 1404.2, 1404.3, 1405, and 2510.6 as follows:
 - a. Provide two layers of Water Barriers.
 - 1) One inner layer of Building Wrap (also qualifies as an "Air Barrier"):
 - a) Seal all laps and penetrations with a 3" wide minimum Sealing Tape.
 - 2) One outer layer of Building Paper.
 - b. The Water Barrier shall be applied horizontally, with the upper layer lapped over the lower layer not less than 6 inches and free from holes and breaks.

- 1) Where vertical joints occur, barrier shall be lapped not less than 6 inches.
- c. Exposure:
 - 1) Maximum exposure of Water Barriers shall be 30 days prior to plaster application or less as required by Water Barrier Manufacturer.
 - a) Protect Water Barriers from the elements (both exposure to the sun and water) with a temporary 6-mil visqueen barrier or other material approved by the barrier manufacturer.

E. Installation of Penetration Flashing:

- 1. Apply Penetration Flashing in conjunction with Water Barriers, Metal Accessories and all other related work.
- 2. Install Penetration Flashing at all openings and penetrations at all exterior walls and at interior walls considered to be "Semi-Wet" and "Wet" exposures (i.e. Toilets, Showers, Lockers, Kitchens, etc.).
- 3. Install Penetration Flashings with Water Barriers, Metal Accessories and all other related work in "shingle" or "weatherboard" fashion.
- 4. Penetration Flashings shall be installed as required in CBC Sections 1405.3 in 9" widths and continuous to 9" past all intersections around all openings, penetrations and termination of plaster systems.
 - a. Should any penetration warrant a greater width of wall flashing, provide 12" wide flashing as required.
 - b. When an object extends through the Cement Plaster System, return the edge of the Penetration Flashing 1" and apply to the sides of the penetrating item.
- 5. Objects such as electrical back-boxes, electrical speaker enclosures, penetrations created by structural members, and the like.

F. Installation of Metal Accessories:

- 1. Apply Metal Accessories in conjunction with Water Barriers, Penetration Flashings and all other related work.
- 2. Install Metal Accessories as required to delineate cement plaster work into areas of the following maximum size and shall be in addition to locations shown on the drawings:
 - a. Vertical surfaces

144 sq.ft.

- b. Horizontal and other non-vertical surfaces 100 sq.ft.
- c. Length-to-width ratios of not greater than 2-1/2:1.
- d. Distances not greater than 18 feet.
- 3. Install Metal Accessories with Water Barriers, Penetration Flashing Sheets and all other related work in "shingle" or "weatherboard" fashion.
- 4. Install all Metal Accessories in accordance with manufacturer's instructions, and the PDSM.
 - a. All Metal Accessories shall be fully supported in accordance with CBC, secure flanges to framing.
 - b. Installed in 10 foot lengths wherever possible.
 - c. All joints (butt, mitered, bent, continuing around corners, or changing directions) shall be cut accurately, welded, or folded, sealed, pop-riveted and sealed again, for a watertight joint.
 - 1) Special Trim Shapes joints (butt, "T," "+," "L" and inside/outside intersections) provide manufacturer's flashing connectors and factory fabricated intersections to connect shapes.
 - a) Provide End Caps at all open ends and when terminated at opening frames and all other construction.
 - b) Butt Joints shall be flush and align with other metal accessories.
 - c) Seal all intersections and ends.
 - 2) Maintain the water barrier continuously behind any joint.
 - 3) Joints shall occur at nearest possible expansion or control joints.

- d. When an object extends through the Cement Plaster System, accurately cut and install in "shingle" or "weatherboard" fashion the Metal Accessories around the penetration. Apply sealant between the metal accessories and the penetrating object.
- 5. Metal Accessories shall be attached to framing members along supports.
 - a. 7 inches o.c. w/o rigid insulation.
 - b. Single Point Separation Screeds can be wire tied over Metal Lath.
 - c. Where dissimilar metals come into surface contact provide electrolytic protection between dissimilar metals using neoprene, plastic sheet, EPDM rubber or other protective coating.

G. Installation of Metal Lath:

- 1. General:
 - a. Apply Metal Lath after the installation of Line Wire, Water Barriers, Penetration Flashings and Metal Accessories.
 - b. Install the various types of Metal Lath at the following conditions:
 - 1) Diamond Mesh Lath at horizontal and vertical surfaces over open framing members at 16 inches on center.
 - 2) Hi Rib Lath at horizontal and vertical surfaces over open framing members at 24 inches on center.
 - 3) Self Furred Diamond Mesh Lath at over Masonry and Concrete surfaces.
 - 4) Woven Wire Fabric Lath over Solid Sheathing.
 - 5) Welded Wire Fabric Lath over Solid Sheathing.
 - c. Apply Metal Lath in accordance with all applicable portions of CBC Chapters 7 and 25, and ASTM C 1063 "Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster."
 - 1) Metal Lath shall be applied with long dimension of sheet perpendicular to the framing members to which it is attached.
 - All fasteners shall be corrosion resistant equal to or superior to that of the lath.
 - b) All lath shall be furred out away from supports and solid substrate at least 1/4 inch.
 - c) Lath shall be attached to framing members along framing members except for 3/8-in. rib metal lath shall be attached at each rib at no more than 7 inches o.c. w/o rigid insulation.
 - 2) The Metal Lath shall be broken at all metal accessories and cut into panels that are defined by the edges of the cement plaster metal accessories, expansion joints and the like.
 - a) Perimeter of the lath panel shall be wire tied to the cement plaster metal accessories.
 - b) No joints shall be permitted at any angle or corner.
 - 3) Lapping of Metal Lath.
 - a) Side laps shall be secured to framing members and shall be wire tied between supports with No. 18 gage (0.0475-inch) galvanized annealed steel wire at 9" o.c. maximum.
 - b) Where end laps occur between the framing members or between attachments, the end of the metal lath sheets shall be laced or wire tied with No. 18 gage (0.0475 inch) galvanized annealed steel wire.
 - c) Expanded Metal Lath shall be lapped 1/2-inch or nest the edge ribs at sides and 1" at ends.
 - d) Wire Fabric Lath shall be lapped one mesh at the sides and the ends.
- 2. Wood Frame Construction:
 - a. Horizontal Framing:

- 1) Roofing nails driven flush with the plaster base providing not less than 3/4-in. penetration into framing members when lath is installed.
 - a) Nail attachments at Hi-Rib Lath to provide not less than 1-3/4 inch penetration into framing members when lath is installed and shall be bent over ribs.
- 2) Screws shall penetrate not less than 5/8-inch into framing members when lath is installed and shall engage not less that three strands of lath.
 - a) Screw attachments at Hi-Rib Lath shall pass through, but not deform rib.
- 3) Where Water Barriers are not required, either of the following attachments shall be used in addition to the methods of attachment set forth in CBC Table No. 2507.2 per CBC Section 2507.3:
 - a) Secure lath to alternate supports with ties consisting of a double strand of No. 18 W & M gage (0.475 inch) galvanized annealed wire at one edge of each sheet of lath. Wire ties shall be installed not less than 3 inches back from the edge of each sheet and shall be looped around stripping, or attached to an 8d common wire nail driven into each side of the joist 2 inches above the bottom of the joist or to each end of a 16d common wire nail driven horizontally through the joist 2 inches above the bottom of the joist and the ends of the wire secured together with three twists of the wire.
 - b) Secure lath to each support with 1/2 inch wide, 1-1/2 inch long No. 9 W & M gage (0.1483 inch), ring shank, hook staple placed around a 10d common nail laid flat under the surface of the lath not more than 3 inches from edge of each sheet. Such staples may be placed over ribs of 3/8 inch rib lath or over back wire of welded wire fabric or other approved lath, omitting the 10d nails.

b. Vertical Framing:

- 1) Wire staples driven flush with plaster base, crown not less than 3/4 inch, shall provide not less than 3/4 inch penetration into framing members when lath is installed and shall engage not less than three strands of lath.
- 2) Common nails or roofing nails driven to penetration of not less that 3/4 inch into framing members when lath is installed and shall be bent over to engage not less than three strands of lath.
 - a) Nail attachments at Hi-Rib Lath shall be bent over ribs.
- 3) Screws shall penetrate not less than 5/8 inch into framing members when lath is installed and shall engage not less than three strands of lath.
 - a) Screw attachments at Hi-Rib Lath shall pass through, but not deform rib.
- 3. Concrete Substrates, Horizontal and Vertical:
 - a. Install power driven or power actuated fasteners:
 - 1) Penetration, min.: 3/4 inch.
 - 2) Location: One fastener at each corner, and one fastener at midpoint of long dimension of lath sheet. Balance of locations may be same fasteners or hardened concrete stub nails.
 - 3) Spacing:
 - a) Horizontal (row), max.: 16 inches on center.
 - b) Vertical (column), max: 7 inches on center.
 - 4) Wire tie laps and metal accessories with expanded metal flanges. Power/powder-actuated fasten accessories with solid flanges.
- 4. Masonry Substrates, Vertical:
 - a. Install screw anchor fasteners per ICC ES Evaluation Report installation requirements.
 - 1) Penetration: 1-1/2 inch.

- 2) Spacing:
 - End distance, min.: a) 3 inches. b) Edge distance, min.: 1-1/2 inch. 1-1/2 inch. Any direction, min.: c)
- 3) Pattern Spacing:
 - Horizontal (row), max: 16 inches. b) Vertical (column), max: 7 inches.
- 5. Wire tie laps and metal accessories with expanded metal flanges. Screw anchor fasten accessories with solid flanges.
- 6. Attach accessories in such a manner as to ensure proper alignment during plaster application.

H. Cement Plaster Installation:

- General: Each plaster coat shall be applied without interruption to entire wall or ceiling panels to eliminate cold joints and abrupt changes in the uniform appearance of succeeding coats. Panels are defined by naturally occurring interruptions in the plane of the plaster, such as corner angles, rustications, openings, and control joints.
- 2. Nominal Cement Plaster Thickness over Metal Lath:
 - At open framing and sheathing substrates, Vertical and Horizontal Surfaces: 7/8" nominal.

3/8". 1) Scratch Coat thickness: 3/8". 2) Brown Coat thickness:

1/8". 3) Finish Coat thickness:

At concrete or masonry substrates, Vertical and Horizontal Surfaces 7/8" nominal. b.

Scratch Coat thickness: 1) 1/2". 2) Brown Coat thickness: 1/4". 3) Finish Coat thickness: 1/8".

Nominal Cement Plaster Thickness over Concrete or Masonry Substrates: 3.

> 1/2" nominal. Masonry Vertical Surfaces: 1) **Bond Coat:** N/A. 2) Brown Coat thickness 3/8".

> 3) Finish Coat thickness 1/8".

Masonry Horizontal Surfaces: 3/8" nominal. b.

1) **Bond Coat:** N/A. 2) Brown Coat thickness 1/4". 1/8". Finish Coat thickness

c. Concrete Vertical and Horizontal Surfaces: 3/8" nominal.

1) **Bond Coat:** N/A. 2) **Brown Coat thickness** 1/4" Finish Coat thickness 1/8".

Where the installed plaster thickness over masonry will exceed the nominal 1/2

- d. inch thickness, the plaster system shall be the three coat application over self-furred expanded metal lath.
- e. Where the installed plaster thickness over concrete will exceed the nominal 3/8 inch thickness, the plaster system shall be the three coat application over self-furred expanded metal lath.
- 4. Scratch Coat Installation:
 - Cover Lath totally and completely with Scratch Coat Mix.
 - Finish: Heavily scratched at right angles to framing members to provide strong b. mechanical key for Brown Coat.
 - Curing: Continuously moist cure a minimum of 48 hours immediately after c. installation and prior to application of Brown Coat.
- 5. Bond Coat Installation:

- a. Apply "Surface Applied Liquid Bonding Agent" Mix solid over masonry or concrete and fill all pores completely to form bonding, water resistant finish.
- b. Cure: In accordance with Manufacturer's requirements and ASTM C 932 "Specification for Surface-Applied Bonding Compounds for Exterior Plastering."
- 6. Brown Coat Installation:
 - a. Apply Brown Coat Mix to slightly damp, and cured Scratch Coat.
 - b. Finish: Dry rod to a straight even plane.
 - c. Float to densify at 1/8 inch in 10 feet and leave rough for finish.
 - 1) At exterior horizontal soffits with recessed light fixtures, provide a smooth and level brown coat finish around the perimeter of the light fixture housing.
 - a) After installation of the brown coat, knock down any ridges and provide a smooth trowel finish within a distance of 3 inches around the light fixture housing. This level of finish is required, so that the light fixture lens (with a compression gasket) can be installed with full contact against the plaster system.
 - b) Coordinate with the electrical contractor and obtain a sample fixture lens, and conduct a pre-cement plaster installation meeting to discuss this topic.
 - d. Curing: Continuously moist cure a minimum of 48 hours immediately after installation and dry cure a minimum of 7 days, allow time for plaster to shrink prior to application of finish coats.
- 7. Finish Coat Installation:
 - a. Exterior Cement System:
 - Provide Open Corner Reinforcement where cement plaster is not divided or separated at opening corners. Place diagonally at all corners of openings and apply with cement adhesive on cured Brown Coat.
 - 2) Apply 2 coats of Finish Coat Mix.
 - a) First coat 1/16 inch minimum. Completely cover to create a bond with Brown Coat.
 - b) Second coat 1/16 inch minimum. Apply immediately after first coat and when first coat is dry using a plaster mix of thinner consistency. Apply to create depth for texture and uniformity.
 - c) Use proportionately more atomizing air at the gun nozzle.
 - 3) Texture: "Light Dash" finish as indicated in the current "Plaster and Drywall Systems Manual."
 - a) Texture to be "Medium Dash" finish when application of paint finish coats to be an "Elastomeric" Paint System.
 - 4) Curing: Continuously moist cure a minimum of 48 hours immediately after installation and dry cure a minimum of 7 days to allow time for plaster to shrink prior to installation of paint finish coats.

3.4 REPAIR / RESTORATION

A. 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.

3.5 FIELD QUALITY CONTROL

A. General: Comply with ASTM C 926 "Standard Specification for Application of Portland Cement-Based Plaster."

- 1. Do not deviate more than plus or minus 1/8 inch in 10 feet from a true plane in finished plaster surfaces, as 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. Site Tests:

- 1. As required by Regulatory Requirements.
- 2. Mock-Up Assemblies:
 - a. Water Spray Test: Upon completion of the installation of the Mock-Up Assembly, conduct test for water penetration in according to AAMA 501.2 requirements.
 - 1) The Project Inspector, the Architect, Contractor's Superintendent and Sub-contactor's Superintendent shall visually inspect for water penetration.
 - 2) A Thermal Imagining process conducted by the Owner's Testing Laboratory Service, shall be used for additional inspection for water penetration.
 - 3) Cost of additional testing and inspection required due to failure for water tightness shall be borne by the Contractor.

b. Reports:

1) Project Inspector and/or Owner's Testing Laboratory Services shall provide a written report noting the installation and water tightness of the Mock-Up Assemblies tested.

C. Inspection:

- 1. As required by Regulatory Requirements and in accordance with CBC Section 2503.
- 2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
- 3. No work shall be without the inspections required by Regulatory Requirements.

3.6 CLEANING

- A. Clean in accordance with Specification Section PROJECT CLOSEOUT.
 - 1. Clean any soiled surfaces immediately.
 - 2. Finish shall be clean and ready for the application of any additional finishes.
 - 3. In accordance with manufacturer's written instructions and recommendations.
- B. Remove temporary protection and enclosure of other work.
- C. Promptly remove plaster from door frames, window and other surfaces not indicated to be plastered.
- D. Repair floors, walls and other surfaces stained, marred or other wise damaged during plastering

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all gypsum board materials, suspension systems, furring, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 06 10 00 ROUGH CARPENTRY
 - 4. 06 41 23 MODULAR CASEWORK
 - 5. 07 21 00 INSULATION
 - 6. 07 92 00 SEALANTS
 - 7. 08 11 00 METAL DOORS AND FRAMES
 - 8. 08 31 13 ACCESS DOORS AND FRAMES
 - 9. 08 33 00 COILING DOORS
 - 10. 09 30 00 TILE
 - 11. 09 50 00 ACOUSTICAL CEILINGS
 - 12. 09 65 10 RESILIENT BASE AND ACCESSORIES
 - 13. 09 67 23 RESINOUS FLOORING
 - 14. 09 72 00 WALL COVERINGS
 - 15. 09 91 00 PAINTING
 - 16. 10 05 00 MISCELLANEOUS SPECIALTIES
 - 17. 10 14 00 IDENTIFYING DEVICES
 - 18. 10 26 00 WALL AND CORNER GUARDS
 - 19. 10 28 13 TOILET ACCESSORIES
 - 20. 10 44 00 FIRE PROTECTION SPECIALTIES
 - 21. 10 51 13 METAL LOCKERS
 - 22. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

- 1. In accordance with the following standards:
 - a. CISCA Ceilings & Interior Systems Construction Association.
 - b. DITF Drywall Industry Trust Fund.
 - c. GA Gypsum Association.
 - d. MPI Master Painters Institute
 - e. PDCA Painting and Decorating Contractors of America.
 - f. PDSM Plaster and Drywall Systems Manual, ©1988 by BNI and McGraw-Hill, Inc., Third Edition.

1.3 SYSTEM DESCRIPTION

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - a. Gypsum board fastening schedule: Indicate type, size and spacing of fasteners for each type of framing and fire resistive condition.
 - b. Manufacturer's written recommended construction instructions or handbook for all gypsum board panel products and accessories.
 - c. Manufacturer's written recommended construction instructions or handbook for all suspension system products and accessories
 - d. Manufacturer's data for all types of gypsum board used on this project.
 - 2. Samples.
 - a. Provide 24 inch square samples for all textures for each level of finish.
 - b. Provide 4 inch lineal samples of each piece of metal trim accessory specified.
 - c. Provide 12 inch lineal samples of Suspension System components for each type of system specified.
 - 3. Quality Assurance/Control Submittals:
 - a. Test Reports:
 - b. Certificates:
 - General Construction: Certificate signed by the Contractor on Contractor's letterhead
 - 2) Products: Certificates signed by manufacturers of gypsum board assembly components.
 - 4. Closeout Submittals in accordance with Specification Section -PROJECT DOCUMENTS.
 - a. Warranty in accordance with Specification Section WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:

- 1. Material Qualifications:
 - a. Where fire-rated gypsum board assemblies are indicated, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 "Test methods for Fire Tests of Building Construction and Materials," by an independent testing and inspecting agency acceptable to CSFM.
 - b. Empty containers shall not be removed from site without the Project Inspector's approval.
- 2. Installer Qualifications:
 - Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - 1) Helpers and apprentices used for such work shall be under full and constant supervision at all times by thoroughly skilled gypsum board installers.
 - 2) In the acceptance or rejection of installed gypsum board, no allowance will be made for lack of skill on the part of installers.
- B. Regulatory Requirements:
 - 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:

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

C. Certificates:

- 1. General Construction: Contractor to certify that work provided, meets or exceeds the requirements of this section.
- 2. Manufacturers of gypsum board assembly components certify that their products comply with specified requirements.
 - a. Certify that all adhesive and compound materials have a good shelf life longer than the construction period of this project.

D. Mockups:

- Before starting the finishing of gypsum board surfaces, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and qualities of materials and execution.
 - a. Install mockups for the following applications:
 - 1) All surfaces without finish texture.
 - 2) All surfaces without finish texture to be painted.
 - 3) All surfaces with finish texture to be painted.
 - b. Simulate finished lighting conditions for review of mockups.
 - c. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Meetings:

- 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

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

B. Acceptance at Site:

- 1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
- 2. Damaged products will not be accepted.
- C. Storage and protection:

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

1.7 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - . Specified gypsum board products manufacturer:
 - a. NATIONAL GYPSUM COMPANY.
 - 1) Wallboard "REGULAR"
 - 2) Water-Resistant "XP GYPSUM BOARD"
 - 3) Shaftwall "SHAFTLINER"
 - 4) Sheathing "GYPSUM SHEATHING"
 - 5) Soffit "EXTERIOR SOFFIT BOARD"
 - b. Acceptable alternative manufacturers:
 - 1) PABCO:
 - a) Wallboard "REGULAR" AND "TYPE X"
 - b) Water-Resistant "MOLD CURB PLUS"
 - c) Shaftwall "MOLD CURB PLUS SHAFLINER"
 - d) Sheathing "GLASS SHEATHING"e) Soffit "EXTERIOR SOFFIT"
 - 2) UNITED STATES GYPSUM COMPANY "SHEETROCK"
 - a) Wallboard "SW EDGE"
 - b) Water-Resistant: "MOLD TOUGH"
 - c) Shaftwall "LINER PANEL-MOLD TOUGH"
 - d) Sheathing "SECUROCK GLASS-MAT SHEATHING"
 e) Soffit "EXTERIOR GYPSUM CEILING BOARD"
 - 2. Specified Roof Board board products manufacturer:
 - a. G-P GYPSUM "DENS-DECK"

- b. Acceptable alternative manufacturers
 - 1) UNITED STATES GYPSUM COMPANY
 - a) SECUROCK Roof Cover Board.
- 3. Specified gypsum board accessories product manufacturer:
 - a. Prep. Coat (Drywall Primer):
 - 1) WESTPAC MATERIALS "PREP COAT"
 - 2) Acceptable alternative manufacturer:
 - a) UNITED STATES GYPSUM SECUROCK First Coat Primer.
 - b. Primer-Surfacer: "TUFF-HIDE"
 - 1) UNITED STATES GYPSUM COMPANY.
 - c. Other Accessories:
 - 1) CLARK DIETRICH BUILDING SYSTEMS, LLC (CDBS).
- 4. Specified revel molding products manufacturer:
 - a. FRY REGLET CORPORATION.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Suspension System:
- B. Wallboard: For interior walls and ceilings.
 - 1. Standard: In accordance with ASTM C 1396 "Standard Specification for Gypsum Board."
 - 2. Size: See drawings for specific thickness locations.
 - a. 5/8 inch thick by 4 foot wide maximum by practical length to minimize joints.
 - When curved walls are indicated on the drawings, provide multiple layers of 1/4 inch & 3/8 inch thick by 4 foot wide maximum by practical length to minimize joints.
 - 3. Long Edges: SW Tapered.
 - 4. Core Type:
 - a. Non-Fire Rated: Regular.
 - b. Fire Rated Type X at fire-resistive-rated assemblies.
 - 5. Finish: Natural-finish face paper suitable for paint, wallpaper or other decorations.
- C. Water-Resistant: For interior walls subjected to, but not constant, moisture and humidity and at adhesive application of ceramic tile and wallcoverings.
 - 1. Standard: In accordance with ASTM C 1396 "Standard Specification for Gypsum Board."
 - a. Surface Burning Characteristics: ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials":
 - 1) Flame Spread: 20.
 - 2) Smoke Developed: 0.
 - 2. Size see drawings for specific thickness locations:
 - a. 5/8 inch thick by 4 foot wide maximum by practical length to minimize joints.
 - 3. Long Edges: Tapered.
 - 4. Core Type:
 - a. Non-Fire Rated: Regular water-resistant core all the way through.
 - b. Fire Rated: Type X and water-resistant additives all the way through, at fire-resistive-rated assemblies.
 - 5. Finish: Multi-layered paper facings, chemically treated to resist moisture penetration.

- 6. Color of the face paper is dependent on the manufacturer.
- D. Sheathing: For exterior walls.
 - 1. Standard: ASTM C 1177 "Standard Specification for Glass-Mat Gypsum Substrate for use as Sheathing."
 - a. Surface Burning Characteristics per ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials":
 - 1) Flame Spread: 20.
 - 2) Smoke Developed: 0.
 - 2. Size:
 - a. 5/8 inch thick by 4 foot wide maximum by practical length to minimize joints.
 - 3. Long Edges: "V" Shaped T & G.
 - 4. Core Type:
 - a. Non-Fire Rated: Gypsum with Fiberglass face and back.
 - b. Fire Rated: Treated Gypsum with fiberglass face and back. at fire-resistive-rated assemblies.
 - 5. Finish Color: Manufacturer's standard.
 - a. Color of the face paper is dependent on the manufacturer.
- E. Soffit: For exterior soffits with indirect weather exposure.
 - 1. Standard: ASTM C1396 "Standard Specification for Gypsum Board."
 - a. Surface Burning Characteristics per ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials":
 - 1) Flame Spread: 20.
 - 2) Smoke Developed: 0.
 - 2. Size:
 - a. 5/8 inch thick by 4 foot wide maximum by practical length to minimize joints.
 - 3. Long Edges: SW Tapered.
 - 4. Core Type:
 - a. Non-Fire Rated: Regular Gypsum with water-resistant additive treatment.
 - b. Fire Rated: Type X with weather resistant additives at fire-resistive-rated assemblies.
 - 1) Available only in 5/8 inch thickness only.
 - 5. Finish: Water-repellant paper facings.
 - a. Color of the face paper is dependent on the manufacturer.
- F. Roof Board:
 - 1. Thickness 5/8 inch.
 - 2. Surfacing: Glass Mat.
 - 3. Flute Spanibility:
 - a. 5/8 inch thick: 8 inches per ASTM E 661 "Test Method for Performance of Wood and Wood-Based Floor and Roof Sheathing Under Concentrated Static and Impact Loads."
 - 4. "R" Value:
 - a. 5/8 inch thick: 0.67 per ASTM C 518 "Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus."
 - 5. Water Absorption: 10.0
 - a. Per ASTM C 473 "Test methods for Physical Testing of Gypsum Panels and Products."
 - 6. Compression Strength: 500-900 psi normal.
 - 7. Surface Water Absorption: 2.5 grams.
 - a. Nominal per ASTM C 473 "Test methods for Physical Testing of Gypsum Panels and Products."
 - 8. Flame Spread / Smoke Developed Index: 0/0.

- a. Per ASTM E 84 "Test Method for Surface Burning Characteristics of Building Materials."
- 9. Mold Resistance: No Growth.
 - a. Per ASTM D 3273 "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber."

G. Metal Accessories:

- 1. Corner Beads:
 - a. Outside Corner, 1-1/4 inch x 1-1/4 inch galvanized:
 - 1) CDBS / USG "Dur-A-Bead" #103.
- 2. Edge Trim:
 - a. "U"-Shaped 1 inch galvanized CDBS / USG #200-A, size to fit gypsum board.
 - b. "L"-Shaped 1 inch galvanized CDBS / USG #200-B, size to fit gypsum board.
 - 1) When "U"-Shaped molding above cannot be used.
- 3. Control Joint:
 - a. 1-3/4" wide, 1/4" wide center channel with removable tape strip:
 - 1) CDBS / USG #093.
- 4. Reveal Moldings (Aluminum Trim): Moldings listed below are manufactured by FRY REGLETS, or approved equivalent.

a.	Reveal Molding	Sized to fit gypsum board.
b.	"L" Trim Molding	Sized to fit gypsum board.
c.	"F" Reveal Molding	Sized to fit gypsum board.
d.	Snap-In Reveal	Sized to fit gypsum board.
e.	"Z" Reveal Molding	Sized to fit gypsum board.
f.	Reveal Channel Screed	Sized to fit gypsum board.
g.	"F" Reveal	Sized to fit gypsum board.
h.	"T" Molding	Sized to fit gypsum board.

2.3 ACCESSORIES

A. Water:

1. Clean, fresh and free from deleterious amounts of foreign material.

B. Fasteners:

- 1. At Gypsum Board: In accordance with the manufacturer's written recommendations and the following:
 - a. Nails: In accordance with CBC Chapter 7 and ASTM C 514 "Standard Specification for Nails for the Application of Gypsum Board."
 - b. Screws: In accordance with CBC Chapter 7, ASTM C 1002 "Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs," type S, G, and W, and ASTM C 954 "Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness," Type S-12.
 - 1) Provide "Bugle Head" screws that help prevent damage to the gypsum core and face paper.
 - c. Adhesives: In accordance with ASTM C 475 "Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board."
 - 1) Commercial adhesives bridging minor irregularities in the base or framing at "non-fire-rated" construction.
 - In accordance with ASTM C 557 "Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing."
- 2. At Suspension Systems:

- a. Wood Construction:
 - 1) Eye screws, minimum 1/4 inch diameter, 1-1/4 inch minimum embedment.
 - 2) Staples, 1-1/2 inch x 0.148 inch diameter (9 gage).
 - 3) Nails, "STRONGHOLD-J" nails.
- b. Steel Framing:
 - 1) Shot-in Anchors.
 - 2) Metal Deck or Metal Deck without Structural Concrete:
 - 3) Screws, self-tapping, minimum #8 x 1/2 inch.
- C. Joint reinforcement tape and joint compounds:
 - 1. In accordance with ASTM C 474 "Standard Test Methods for Joint Treatment Materials for Gypsum Board Construction" and C 475 "Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board," and Gypsum Board Manufacturer's written recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.
 - a. Joint Tapes:
 - 1) Paper reinforcing tape, unless otherwise indicated.
 - 2) Polymer-coated, open glass-fiber mesh for cementitious backer units.
 - b. Setting-Type Joint compounds for gypsum board: Factory-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated.
 - 1) When used for taping and filling only, use formulation that is compatible with other joint compounds applied over it.
 - 2) When used for pre-filling gypsum board joints, use formulation recommended by gypsum board manufacturer for this purpose.
 - 3) When used for filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by the gypsum board manufacturer for this purpose.
 - 4) When used for topping compound, use sandable formulation.
- D. Prep. Coat: Provide a preparation coat of the specified material to gypsum board surfaces to be decorated with all paints.
- E. Primer-Surfacer: "TUFF-HIDE" by USG, Interior White Latex High Build Spray for a smoother paint finish over all types of drywall, 9.8 to 13 mils DFT in one spray application
- F. Textured Finish Coats: Gypsum Board manufacturer supplying the products to this project shall also supply the Texture Finishes to provide distinctive appearance and surface decoration to gypsum board panel walls and ceilings, and as scheduled at the end of this Specification Section.
- G. Other Materials: All other miscellaneous materials, not specifically described, but required for a complete and proper installation of gypsum board, shall be as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site verification of conditions:
 - 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual which affect the execution of work under this specification section.

- 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
- 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

- Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
- 2. Coordinate proper placement of ceiling mounted tracks, accessories, light fixtures, HVAC, registers and other items, which are to be integrated with gypsum board ceilings.

B. Protection:

- 1. Do not begin work until all rooms have been protected against the weather, and the building is covered and fully enclosed. Wet gypsum board after installation shall be removed and replaced at no extra cost to the Owner.
- 2. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:

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

3.3 INSTALLATION

A. General:

- 1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
- 2. In accordance with Regulatory Requirements.
 - a. DSA's IR 25-3 "Drywall Ceiling Suspension Conventional Construction-One Layer."
- 3. Set plumb, level, and square.

B. Layout:

- 1. Lines shall be straight and true.
- 2. Control Joints:
 - a. Layout in accordance with GA-234-08 for both Non-Rated and Rated wall and ceiling conditions as follows:
 - Provide Control Joints at in an uninterupted straight plane exceeding 30 ft. in length and total area between control joints, such that no area exceeds 900 sq.ft.
- C. Suspension System Installation: In accordance with DSA's IR 25-3.

D. Furring Channels:

1. Attach hat channels at 16" o.c. to framing members at 24" o.c. maximum with one 1-1/2" Type "G" screw at each bearing point. Stagger screws to opposite sides at every bearing surface.

E. Gypsum Board:

1. General:

- a. During Winter Weather Installation periods, follow the GA-220 GYPSUM BOARD WINTER RELATED INSTALLATION RECOMMENDATIONS.
- 2. Install in accordance with CBC Chapter 25, DITF and GA recommendations, gypsum board panel manufacturer's written recommendations and in accordance with fire-rated design numbers.
 - a. At Ceilings and Soffits:
 - 1) At gypsum board ceilings and soffit areas, install the ceiling prior to installing the walls.
 - 2) Float the interior ceiling angles, and where permitted by code,
 - b. At Sound and Acoustical Walls:
 - Set all gypsum board panels on each side of the partition in a continuous 1/4 inch bead of acoustical sealant furnished and installed in accordance with the provisions of Specification Section -- SEALANTS.
 - c. At Water Resistant Walls:
 - 1) Install where scheduled and in all areas where high moisture conditions are present, or ceramic tile, or wall coverings are scheduled over gypsum board.
 - 2) In all areas to be tiled, treat all edges, cutouts, utility holes and joints, corners and nailheads with an approved sealant material in lieu of standard taping. Joints not to be covered by tile shall be treated as regular gypsum board. Do not use standard joint compound under ceramic tile.
 - d. At Sheathing:
 - 1) Screw-attach sheathing to exterior of each stud with 1" Type "S-12" corrosion resistant screws spaced 3/8" from ends and edges and approximately 8" o.c. Apply sealant around sheathing perimeter at interface with other materials and install flashing.
- 3. Install gypsum board panels horizontally on walls, floor to ceiling.
- 4. At metal frames terminate wall board panel edge inside frame. Do not terminate gypsum board panel edge against metal frame trim unless otherwise indicated.

F. Cutting:

- 1. Cut gypsum board panels by scoring and breaking or by sawing, working from the face side.
 - a. When cutting by scoring, cut through the face paper and then snap the panel back away from the cut face; then break the backpaper by snapping the panel in the reverse direction or by cutting the back paper.
- 2. Smooth all cut ends and edges of panels as necessary to obtain a smooth joint.
- 3. For cut-outs in panels for pipes, fixtures, and other small openings, make holes and cut-outs by sawing or by such other method as will not fracture the core or tear the covering and with such accuracy that plates, escutcheons, or trim will cover the edges.
- 4. The use of "score-and-knockout" method will not be permitted.

G. Metal Accessories:

- Corner Beads:
 - a. Install at all corners with galvanized screws at nine (9) inch intervals in both flanges with fasteners placed opposite one another the full length of the corner bead. Clinch-on fastening is not allowed.
 - 1) Fasteners shall be driven below the anticipated finished joint compound surface.
 - b. Install in one piece except when length of corner exceeds stock lengths then put splice up high away from people traffic.
- 2. Edge Trim: Install at all exposed joints where gypsum board panels abut another material with galvanized screws at nine (9) inch intervals the full length of the edge trim. Clinch-on fastening is not allowed.

- a. Fasteners shall be driven below the anticipated finished joint compound surface.
- b. Provide joint sealer in accordance with Specification Section -- SEALANTS.
 - Provide fire sealant in accordance with Specification Section -- FIRSTOPPING or Specification Section -- SEALANTS, when the wall or ceiling is part of a fire-rated situation.

3. Control Joints:

- a. Install at 30'-0" o.c. maximum at all interior walls or partitions with uninterrupted planes that exceed 30' in length.
 - 1) Opening frames that are full height of wall or partition may be considered a control joint.
- b. Install at 50'-0" o.c. maximum at all interior ceilings and shall not exceed 2,500 sq.ft. in total area with perimeter relief.
- c. Install at 30'-0" o.c. maximum at all interior ceilings and shall not exceed 900 sq.ft. in total area without perimeter relief.

H. Fastening:

- 1. Properly space all fasteners in careful accordance with the manufacturer's written recommendations and code requirements, with heads driven slightly below the surface for proper cementing, but without breaking the paper face.
- 2. Loosely butt all joints to be taped; firmly butt all joints to be left untreated.
- 3. Stagger all end joints and the joints between panels to achieve a maximum of bridging and a minimum of continued joints.

I. Taping and Finishing:

- First Coat:
 - a. Spread compound evenly over all joints, using suitable tools designed for the purpose.
 - b. Fill all joint recesses and metal trim.
 - c. Center the reinforcing tape on the joint and press into the fresh compound at all joints, wiping down with sufficient pressure to remove excess compound but leaving sufficient compound under the tape for proper bond.
 - d. Feather all edges and leave the surface free from blisters and tape wrinkles.
 - e. Apply compound to all fastener recesses, leaving flush with the adjacent surfaces.
 - f. Fold reinforcing tape along its centerline and apply to all interior angles, following the same procedure as for joints.
 - g. Surfaces shall be free of excess joint compound.

2. Second Coat:

- a. Lightly sand the dry compound with fine sandpaper to remove all irregularities.
- b. Apply a second coat of compound to all joints, feathering approximately three inches beyond edges of tape.
- c. Apply second coat to all fastener recesses.
- d. Surfaces shall be free of excess joint compound.

3. Third Coat:

- a. Lightly sand the dry compound with fine sandpaper to remove irregularities.
- b. Apply final skim coat, feathering out approximately two inches beyond second
- c. Third coat all fastener recesses and metal trim, and all interior angles; allow to dry.
- d. Surfaces shall be free of excess joint compound.

J. Prep. Coat (Drywall Primer):

1. Apply Prep. Coat material at approximately 200 sq.ft. per gallon for all painted wall surfaces. Follow manufacturer's written recommendations for proper preparation of material, mixing and installation at recommended minimum coverage rates.

- a. For smooth walls with no texture, provide airless sprayer application in accordance with manufacturer's written recommendations.
 - 1) Fine finish: Sand wall surface with 220 grit mesh screen after application of Prep. Coat. **Do not oversand!**
- b. For textured walls: Provide roller application with a 3/8" to 1/2" nap roller before texture application is applied in accordance with manufacturer's written recommendations.

K. Primer - Surfacer:

- 1. Apply Primer Surfacer material at manufacturer's written recommendations for proper preparation of material, mixing and installation, and at recommended minimum coverage rates.
 - a. For smooth walls with no texture, provide airless sprayer application in accordance with manufacturer's written recommendations.
 - 1) Fine finish: Sand wall surface with 220 grit mesh screen after application of Primer Surfacer. **Do not oversand!**
 - b. For textured walls: Provide roller application with a 3/8" to 1/2" nap roller before texture application is applied in accordance with manufacturer's written recommendations.
- L. Textured Finish Coats: After taping and finishing, apply Textured Finish Coats as indicated in the schedule at the end of this Specification Section.

3.4 FIELD QUALITY CONTROL

A. Site Tests:

- 1. Testing Agency: The Owner's Testing Laboratory Agency shall perform field tests and Inspections and prepare test reports.
 - a. Testing and inspecting of completed installations of suspended gypsum board ceiling fasteners and anchors shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with installations of gypsum board ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
- 2. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed:
 - a. Concrete Anchors:
 - 1) Must be capable of sustaining, without failure, a load equal to 200 lbs. tension for hanger wires and 440 lbs. tension for bracing wires by construction as determined by testing according to ASTM E 488 "Test Methods for Strength of Anchors in Concrete and Masonry Elements," by a qualified independent testing agency.
 - a) Hanger Wire Anchors 1 in 10 must be field tested.
 - b) Bracing Wire Anchors 1 in 2 must be field tested.
- 3. Remove and replace gypsum board ceiling hangers where test results indicate that they do not comply with specified requirements.
- 4. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 - a. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors of previously tested until 20 pass consecutively and then will resume initial testing frequency.
- B. Inspection:

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

3.5 CLEANING

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

3.6 PROTECTION

- A. Protection from weather:
 - 1. Protect newly installed work from moisture after installation.
- B. Protection from traffic:
 - 1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.7 SCHEDULES

- A. The following textured finish coat finishes shall be applied to the board surfaces within the scope of this section prior to covering with other finish materials.
 - 1. Refer to the Material and Finish Schedule for specific locations of each substrate finish.
 - 2. Where no specific substrate finish is called for on the drawings, select the appropriate level of substrate finish from the descriptions below for the final finish material.
 - 3. Where no determination can be made from the descriptions below, provide a minimum of GB-2 substrate finish.
 - 4. Where sound, smoke control or fire-ratings are required, details of construction shall be in accordance with reports of tested assemblies meeting the requirements.
- B. GB-1 Architect's Finish Designation:
 - Level 5 GYPSUM ASSOCIATION'S LEVEL OF GYPSUM BOARD FINISH:
 - a. All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. A thin skim coat of joint compound or a material manufactured especially for this purpose, shall be applied to the entire surface. The surface shall be smooth and free of tool marks and ridges.
 - b. Architect's Finish:
 - 1) Uniformly smooth and ready to receive Large Format Tiles, light grade wallcoverings, or fine textured finishes, or flat, semi-gloss, or gloss paints over flat surfaces.
 - 2) Use "Fog and Splatter" fine textured finish where walls and ceilings are scheduled to be painted, unless otherwise noted.
- C. GB-2 Architect's Finish Designation:

- 1. Level 4 GYPSUM ASSOCIATION'S LEVEL OF GYSPSUM BOARD FINISH:
 - a. All joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compound surfaces shall be smooth and free of tool marks and ridges.
 - b. Architect's Finish:
 - Uniformly smooth and ready to receive light textures ("Spray-Splatter,"
 "Orange Peel" (light or heavy) "Stipple" or "Skip Trowel" finishes), or
 medium grade wall-coverings.
 - 2) Use "Orange Peel" light texture finish when walls and ceilings are scheduled to be painted, unless otherwise noted.

D. GB-3 - Architect's Finish Designation:

- Level 2 GYPSUM ASSOCIATION'S LEVEL OF GYSPSUM BOARD FINISH:
 - a. All joints and interior angles shall have tape embedded in joint compound and wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Fastener heads and accessories shall be covered with a coat of joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable. Joint compound applied over the body of the tape at the time of tape embedment shall be considered a separate coat of joint compound and shall satisfy the conditions of this level.
 - b. Architect's Finish:
 - Total surface must be sufficiently smooth to create a good bonding plane acceptable for installation of scheduled materials (ceramic tile, plywood, acoustical tile or similar materials).
- E. GB-4 Architect's Finish Designation:
 - 1. Level 3 GYPSUM ASSOCIATION'S LEVEL OF GYSPSUM BOARD FINISH:
 - a. All joints and interior angles shall have tape embedded in joint compound and one additional coat of joint compound applied over all joints and interior angles. Fastener heads and accessories shall be covered with two separate coats of joint compound. All joint compound shall be smooth and free of tool marks and ridges.
 - b. Architect's Finish:
 - 1) Uniformly smooth and ready to receive heavy grade wallcoverings or medium heavy texture finishes (spray or hand applied).
 - 2) Use medium textured finishes where walls and ceilings are scheduled to be painted, unless otherwise noted.
- F. GB-5 Architect's Finish Designation:
 - 1. Level 1 GYPSUM ASSOCIATION'S LEVEL OF GYSPSUM BOARD FINISH:
 - a. All joints and interior angles shall have tape set in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.
 - b. Architect's Finish:
 - 1) No applied texture. Use at areas that are above finished ceilings, in attics, in areas where the assembly would generally be concealed.
- G. GB-6 Architect's Finish Designation:
 - 1. Level 0 GYPSUM ASSOCIATION'S LEVEL OF GYSPSUM BOARD FINISH:
 - a. No taping, finishing, or accessories required.
 - b. Architect's Finish:
 - 2. Intended for "Temporary Partitions" and not for permanent construction. Not suitable for Fire-resistive construction.
- H. Non-rated and fire-rated wall signage:

- 1. Provide identification on both sides of all non-rated, fire-rated, and area separation walls with 3" high stenciled letters above ceiling line and no further than 30' from the adjacent identification symbol. Intersecting walls with different ratings shall be identified 5' from such intersection. All identification symbols shall be visible without the aid of a ladder or other similar devices. Colors listed below are from PPG/ICI's "DEV-GUARD" 4208 Series Industrial Interior Enamel line.
 - a. IDENTIFICATION COLOR OF IDENTIFICATION
 - b. Non-Rated Wall Semi-Gloss Black
 - c. 1-HR Fire Wall Fire Red
 - d. 1-HR Occupancy Separation Wall International Orange
 - e. 2-HR Fire Wall Safety Blue
 - f. 2-HR Occupancy Separation Wall Cobalt Blue
 - g. 2-HR Shaft Wall Safety Green
 - h. 3-HR Fire Wall Prairie Beige
 - i. 4-HR Fire Wall Safety Yellow

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 093000 - TILE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all tile materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 30 00 CAST-IN-PLACE CONCRETE
 - 4. 06 10 00 ROUGH CARPENTRY
 - 5. 07 92 00 SEALANTS
 - 6. 08 31 13 ACCESS DOORS AND FRAMES
 - 7. 09 24 00 CEMENT PLASTER
 - 8. 09 29 00 GYPSUM BOARD
 - 9. 10 28 13 TOILET ACCESSORIES
 - 10. 10 51 13 METAL LOCKERS
 - 11. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

- 1. In accordance with the following standards:
 - a. ADAAG Americans with Disabilities Act Accessibilities Guidelines
 - b. ADAS Americans with Disabilities Act Standards
 - c. ANSI American National Standards Institute, Specifications for the Installation of Ceramic Tile, latest edition, unless otherwise indicated.
 - d. FDA Food and Drug Administration
 - e. TCNA Tile Council of North America "Handbook for Ceramic Tile Installation"

1.3 DEFINITIONS

- A. Definitions shall comply with the latest edition of the TCNA "Handbook for Ceramic Tile Installation."
 - 1. MOH's: Relative Measure of Hardness by scratching the surface of the tile with different minerals and subjectively assigning a "MOH's Scale Hardness" number to the glaze.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data:
 - a. For each type of Tile indicated.

- b. Refer to Interior Color Schedule.
- c. Design Data for components, fillers, adhesives, etc.
- 2. Shop Drawings:
 - a. Location of all movement/expansion joints.
- 3. Samples:
 - a. Sample of each color and pattern selected.
 - b. Samples of each piece of trim material specified.
- 4. Quality Assurance/Control Submittals:
 - a. Test Reports:
 - 1) From Manufacturer that all floor tile complies with the slip resistance standards recommended by the ADAAG/ADAS.
 - b. Certificates:
 - 1) Provide TCNA Master Grade Certificate.
 - c. Manufacturer's Written Installation Instructions.
 - d. Statement of Installer's Qualifications.
- 5. Closeout Submittals in accordance with the following:
 - a. Maintenance Data in accordance with Specification Section PROJECT CLOSEOUT.
 - b. Warranty in accordance with this specification, and with Specification Section WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:

- 1. Material Qualifications:
 - a. Tile Grade: Standard Grade in accordance with ANSI A 137.1x.
 - b. Tile shall meet the Breaking Strength limits listed in accordance with ASTM C 648 "Test Method for Breaking Strength of Ceramic Tile."
 - c. Tile shall meet the Scratch Hardness limits in accordance with MOH's
 - d. TCNA Master Grade Certificate signed by tile manufacturer and tile installer.
- 2. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.

B. Regulatory Requirements:

- 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. CBC California Building Code (CBC 804.1)

C. Meetings:

- 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 - c. Review delivery, storage, and handling procedures.
 - d. Review Project Conditions.
 - e. Review subfloor preparation procedures.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.

- b. Identify any installation problems and acceptable corrective measures.
- c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 - 1. Products shall be handled in such a manner as to assure that they are free from dents, chips, scratches and other damage.
- B. Acceptance at Site:
 - 1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
 - 2. Damaged products will not be accepted.
- C. Storage and protection:
 - 1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

- A. Environmental requirements:
 - 1. Temperature:
 - a. Maintain temperature in space to receive ceramic tile above 50 degrees F for 3 days prior, during, and 7 days following installation.
- B. Existing Conditions:
 - 1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
 - 2. Field Measurements:
 - a. Take and be responsible for field measurements as required.
 - b. Report any significant differences between field dimensions and drawings to the Architect.

1.8 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty,
 - 2. Warranty Period shall be for the following:
 - a. Interior Ceramic Tile One (1) Year.

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

1.9 MAINTENANCE

- A. Extra Materials:
 - 1. Maintenance Material:
 - a. In accordance with Specification Section PROJECT CLOSEOUT.
 - b. Supply 2 square feet of tile and 3 lineal feet of trim for each color and pattern of tile

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Interior Ceramic Tile manufacturer:
 - a. DALTILE.
 - b. Acceptable alternative manufacturers:
 - 1) CROSSVILLE CERAMICS.
 - 2) INTERCERAMIC.
 - 2. Exterior Accent Ceramic Tile manufacturer:
 - 3. Grout Materials manufacturer:
 - a. MAPEI.
 - b. Acceptable alternative manufacturers:
 - 1) CUSTOM BUILDING PRODUCTS, INC.
 - 2) LATICRETE.
 - 4. Mortar Materials manufacturer:
 - a. MAPEI.
 - b. Acceptable alternative manufacturers:
 - 1) CUSTOM BUILDING PRODUCTS, INC.
 - 2) LATICRETE.
 - 5. Metal Trim manufacturer:
 - a. SCHLUTER SYSTEMS
 - 6. Admixture manufacturer:
 - a. MAPEI "Plancrete AC."
 - 7. Membranes manufacturer:
 - a. THE NOBLE COMPANY.
 - b. Acceptable alternative manufacturers:
 - 1) DALTILE.
 - 2) INTERCERAMIC
 - 8. Cementitious Backer Units manufacturer:

USG CORPORATION a.

"DUROCK Cement Board"

"C-Cure Board 990"

- Acceptable alternative manufacturers: b.
 - 1) C-CURE
 - 2) **CUSTOM BUILDING PRODUCTS** "Wonderboard"

 - 3) FINPAN, INC. "Util-A-Crete Concrete Backer Board"
- 9. Sealer manufacturer:
 - CUSTOM BUILDING PRODUCTS Tile Lab "Surface Gard Penetrating Sealer"
 - 1) Acceptable alternative manufacturers:
 - C-CURE "Penetrating Sealer #978"
- B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 **MATERIALS**

- A. General:
 - Slip Resistance: 1.
 - Level Surfaces:
 - 1) Static Coefficient of Friction (SCOF): Tile installed on level walkway surfaces shall be slip resistant by achieving a minimum 0.6 or greater static coefficient of friction as recommended in Appendix A4.5 of the ADAAG by testing per ASTM C 1028 "Test method for Static Coefficient of Friction of Ceramic Tile and Like Surfaces by the Horizontal Dynometer Pull Meter Method."
 - 2) Dynamic Coefficient of Friction (DCOF): Tile installed on level walkway surfaces shall be slip resistant by achieving a minimum 0.42 or greater dynamic coefficient of friction as recommended in ADAS per TCNA technical bulletin "Coefficient of Friction and the DCOF AcuTest," by testing per ANSI A 137.1 "American National Standard Specifications for Ceramic Tile," section 9.6 "Procedure for Dynamic Coefficient of Friction (DCOF) Testing."
 - Colors and patterns shall be selected from manufacturer's standard line (including 2. premium), except as noted otherwise.
- Ceramic: В.
 - Interior Floor Tile **CT-1.**
 - DALTILE. Manufacturer: a.
 - 1) "Keystones" unglazed mosaics, Groups 1,2,3,4 and S.
 - 2) Trim to match.
 - Tile Trim Units: Provide tile trim units (i.e. "bullnoses," "thin-set bullnoses," "coves," "thin-lip bases," "round top bases," "beads," and "countertop edge trims" as is appropriate to tile types) to match characteristics of adjoining flat tile.
 - Design: 2" x 2" x 1/4" thick. b.
 - Pattern: Any combination thereof of the sizes listed above, to be back/edge c. mounted on manufacturers strong, flexible 2' x 1' sheets.
 - 1/8". d. Grout joint width:
 - Color: Refer to Interior Color Schedule. e.
 - Unglazed Porcelain Ceramic Mosaics. f. Material:
 - 1) Water Absorption: less than 0.5 percent. 2) Breaking Strength: greater than 364 lbs.
 - 3) Chemical Resistance: Resistant.

- 4) Bond Strength: greater than 65 psi.
- 5) Coefficient of Friction: greater than or equal to 0.60.
- g. Base:
 - 1) 6" high x 12" long x 2" x 2" back/edge mounted built-up coved base, including inside and outside corner trims.
 - 2) Pattern to match floor tile.
- 2. Interior Wall Tile: **CT-2.**
 - a. Manufacturer: DALTILE.
 - 1) Color Wheel Collection, Semi-Gloss, Matte or Crystaltex, Groups 1 and 2.
 - 2) Trim to match.
 - a) Tile Trim Units: Provide tile trim units (i.e. "bullnoses", "thin-set bullnoses," "coves," "thin-lip bases," "round top bases," "beads," and "countertop edge trims" as is appropriate to tile types) to match characteristics of adjoining flat tile.
 - b. Design: 4-1/4" x 4-1/4" x 5/16" thick.
 - c. Pattern: Single size tile pattern.
 - d. Grout joint width: 1/16".
 - e. Color: Refer to Interior Color Schedule.
 - f. Material: Interior Glazed Ceramic.
 - 1) Water Absorption: less than 16.0 percent.
 - 2) Scratch Hardness: 4.
 - 3) Chemical Resistance: Resistant.
 - g. Base:
 - 1) 4-1/4" x 4-1/4" coved based including inside and outside corner trims.
 - 2) Pattern to match wall tile.
- 3. Interior "Accent" Wall Tile: CT-3.
 - a. Manufacturer: DALTILE.
 - 1) Color Wheel Linear, Semi-Gloss, Groups 1 and 2.
 - 2) Trim to match.
 - Tile Trim Units: Provide tile trim units (i.e. "bullnoses", "thin-set bullnoses," "coves," "thin-lip bases," "round top bases," "beads," and "countertop edge trims" as is appropriate to tile types) to match characteristics of adjoining flat tile.
 - b. Design: 4" x 12" x 5/16" thick.
 - c. Pattern: Single size tile pattern.
 - 1) Grout joint width: 1/16".
 - d. Color: Refer to Interior Color Schedule.
 - e. Material: Interior Glazed Ceramic.
 - 1) Water Absorption: less than 16.0 percent.
 - 2) Scratch Hardness: 4.
 - 3) Chemical Resistance: Resistant.
- 4. Interior "Accent" Wall Tile: **CT-4.**
 - a. Manufacturer: DALTILE.
 - 1) Color Wheel Linear Semi-Gloss, Group 3
 - 2) Trim to match.
 - a) Tile Trim Units: Provide tile trim units (i.e. "bullnoses", "thin-set bullnoses," "coves," "thin-lip bases," "round top bases," "beads," and "countertop edge trims" as is appropriate to tile types) to match characteristics of adjoining flat tile.
 - b. Design: 4" x 12" " x 5/16" thick.
 - c. Pattern: Single size tile pattern.
 - 1) Grout joint width: 1/16".
 - d. Color: Refer to Interior Color Schedule

e. Material: Interior Glazed Ceramic.

1) Water Absorption: less than 16.0 percent.

2) Scratch Hardness:

3) Chemical Resistance: Resistant.

- 5. Interior Floor Tile CT-5 (MATCH TO EXISTING)
- 6. Interior Wall Tile CT-6 (MATCH TO EXISTING)
- 7. Exterior "Accent" Wall Tile: CT-4.
- 8. Exterior "Accent" Wall Tile: CT-5.
- 9. Exterior "Accent" Wall Tile: CT-6.

C. Setting Bed:

- 1. Thin-Set:
 - a. Dry-Set Portland Cement Mortar: In accordance with ANSI A 118.1-1999.
 - 1) Shall be "Kerabond" by MAPEI, or approved equivalent for floor and wall surfaces.
 - a) For wall applications, provide non-sagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.

4.

D. Grout:

- 1. Cement:
 - a. ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated.
- 2. Commercial Cement:
 - a. ANSI A118.6, composed of Standard Sanded Cement Grout, color as indicated.
- 3. Silicone-Rubber:
 - a. One-part, chemically curing, silicone-rubber-based elastomeric sealants used for factory-grouted joints within pre-grouted sheets of glazed wall tile and for field-grouted joints between the same pre-grouted sheet
 - Silicone-Rubber grout shall not be used on kitchen countertops or other food preparation surfaces unless it meets the requirements of FDA Regulation No. 21, CFE 177.2600.
- 4. Dry-Set:
 - a. ANSI A 108.5-1999 and ANSI A 118.1-1999, a mixture of Portland Cement with sand and additives, color as indicated.
- 5. Epoxy:
 - a. ANSI A118.3-1999, Chemical-Resistant, Water-Cleanable, Ceramic Tile-Setting and Grouting Epoxy, color as indicated.

E. Metal Trim:

- 1. Outside Wall Corner and Edges Metal Trim
 - a. Manufacturer: Schluter, JOLLY
 - b. Material: Extruded Aluminum
 - c. Finish: Natural (AN)

2.3 ACCESSORIES

A. Membranes:

- 1. Wall:
 - a. Polyethylene, 4 mil sheet with 6 inch laps at wet areas.
 - b. Polyethylene, 6 mil sheet with 6 inch laps at shower areas adjacent to concrete or masonry wall areas.
- 2. Floor:

- a. Thin-Set: Nonplasticized, chlorinated polyethylene sheet faced on both sides with nonwoven polyester fabric; 0.030 inch nominal thickness, water vapor transmission rate 0.15 perms per ASTM E 96 "Test Methods for Water Transmission of Materials," Procedure E.
 - 1) "Nobleseal TS" by THE NOBLE COMPANY.
 - 2) Approved equivalent: "Dal-Seal CIS" by DALTILE over a skim coat of "Keralastic" + "Kerabond" by MAPEI.

B. Miscellaneous Materials:

1. Provide miscellaneous guides, shims, spacers, rust resistant fasteners, etc., applicable to substrates and finish materials necessary for flat and true surfaces that minimize cracks, bulges and uneven surfaces.

C. Cleaners:

1. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

D. Sealers:

1. Grout and Tile Sealer: Manufacturer's standard product for sealing grout joints and tile surfaces that does not change color or appearance of grout or tile.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
- C. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

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

- 2. Prior to installation of Tile, inspect the installed work executed under other Sections which affect the installation of Tile.
 - a. Prepare masonry surfaces with a parge coat and cure so that all surfaces are flat prior to the installation of tile.

B. Protection:

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

C. Surface preparation:

- 1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
- 2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
- 3. Fill cracks, holes, and depressions in concrete substrates for tile floors with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- 4. Maximum backing surface variations shall be as follows:
 - a. Mortar Bed at Floors: 1/4 inch in 10 feet from required plane.
- D. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION

A. General:

- 1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
- 2. In accordance with approved submittals.
- 3. In accordance with Regulatory Requirements.
- 4. Set plumb, level, and square.
- 5. Determine location of all movement/expansion joints before starting tile work.
- 6. Install Cementitious Backer Units in accordance with Cementitious Backer Unit Board Manufacturer's recommendations.
 - a. Shim Cementitious Backer Unit Boards as required for a flat and true surface plane with no bulges or uneven or flared surfaces.
 - b. Set shims at fasteners.
 - c. Fasten with corrosion resistant, waferhead, self-drilling screws with countersinking ribs, min. 8 gauge. Set flush with Board's surface. Fasten thru shims.
- 7. Determine location of all toilet accessories before starting tile work.
- 8. Isolate tile installations from concrete slabs at shower floor areas to minimize cracking of the tile installation systems. Install in accordance with the TCNA recommendations using cleavage membranes.
 - a. Provide crack isolation membranes as required in accordance with TCNA installation requirements.

9. Provide wall membranes as required by TCNA installation requirements.

B. Layout:

- 1. Lines shall be straight and true.
- 2. Refer to Wall and Floor Pattern Drawing(s) in the Interior and Exterior Color Schedules for layout of patterns.
- 3. Lay out all tile work to minimize cuts less than one-half in size.
- 4. Lay out tile wainscots to next full tile beyond dimension shown.

C. Joints

- 1. General: Movement/Expansion Joints shall be placed in accordance with the TCNA recommendations for placement.
- 2. Align all wall joints to give straight uniform grout lines, plumb and level.
- 3. Align all floor joints to give straight uniform grout lines, parallel with walls.
- 4. All joints shall be uniform in width.
- 5. Locate expansion joints in the tilework:
 - a. Over construction or expansion joints in the backing.
 - b. Where backing materials change or change directions.
 - c. At wall/floor intersections.
 - d. Exterior work:
 - 1) Not more than 8 12 feet in each direction.
 - e. Interior work:
 - 1) Not more than 20 25 feet in each direction.
 - a) Interior tilework exposed to direct sunlight or moisture: 8 to 12 feet in each direction.
 - b) Above ground concrete slab substrate: 8 to 12 feet in each direction.
- 6. Movement/expansion joint width sizes:
 - a. Working Butt Joints 1/4 inch minimum.
 - b. Working Lap Joints 1/8 inch minimum.
- D. Flatness and Lippage:

b.

- 1. Maximum lippage between adjacent units: 1/32 inch.
- E. Tile System Installations:
 - 1. Interior Floor:
 - a. System IFA: Concrete Sub-Floor, thin-set installation: SYS-IFA.
 - 1) Use: Dry or Limited water exposure.
 - 2) Method: Dry-set Mortar or Latex-Portland Cement Mortar.
 - 3) Detail Standard: TCNA F113-, 3/32" thin-set Dry-set or Latex-Portland Cement Mortar, Bond Coat, Tile, Grout.
 - 4) Installation Standard:
 - a) Tile: ANSI A 108.5. b) Grout: ANSI A 108.10.
 - System IFB: Concrete Sub-Floor, mortar bed installation
 - 1) Use: Dry or Wet (Kitchens and Toilets).
 - 2) Method: Cement Mortar.
 - 3) Detail Standard: TCNA F114 Cleavage Membrane, Reinforcing, 1-1/4" to 2"- Mortar Bed, Bond Coat, Tile, Epoxy Grout.

SYS-IFB.

- 4) Flush Grout with tile surface at kitchen floors only.
- 5) Installation Standard:
 - a) Tile: ANSI A 108.1B.
 - b) Epoxy Grout: ANSI A 108.6.

c. System IFC: Concrete Sub-Floor, shower receptor mortar bed installation:

SYS-IFC.

1)

Use:

Wet Exposure (Showers).

2) Method: Cement Mortar.

- 3) Detail Standard: TCNA B414 Tile or Stone, Shower Membrane, 1" to 1-3/4" Reinforced Mortar Bed, Bond Coat Tile, Grout.
- 4) Installation Standard:

a) Tile: ANSI A 108.1B.
b) Grout: ANSI A 108.10.
c) Shower Pan Membrane ANSI A108.01-3.6

- d. System IFD: Concrete Sub-Floor, Cementitious Backer Installation SYS-IFD.
 - 1) Use: Wet Exposure (Showers).
 - 2) Method: Latex Portland Cement Mortar.
 - 3) Detail Standard: TCNA B 415 shower floor membrane, cementitous backer unit over Wood or Metal studs or fiber cement underlayment, reinforced mortar bed, tile.
 - 4) Installation Standard:

a) Tile: ANSI A 108.5.
 b) Grout: ANSI A 108.10.
 c) Shower Pan Membrane ANSI A108.01-3.6.

- 2. Interior Wall:
 - a. System IWA: Masonry or Concrete Walls, thin-set installation SYS-IWA.
 - 1) Use: Dry or Limited Water Exposure (Toilets).
 - 2) Method: Cement Mortar.
 - 3) Detail Standard: TCNA W202I 3/32" Thin-Set Mortar Bed Bond Coat, Tile, Epoxy Grout.
 - 4) Installation Standard:

a) Tile ANSI A 108.5.b) Epoxy Grout ANSI A 108.6.

- b. System IWB: Masonry or Concrete Walls, mortar bed installation **SYS-IWB.**
 - 1) Use: Dry or Limited Water Exposure (Toilets).
 - 2) Method: Cement Mortar, Bonded.
 - 3) Detail Standard: TCNA W211 3/8" to 3/4" Mortar Bed, Bond Coat, Tile, Grout.
 - 4) Installation Standard:

a) Tile ANSI A 108.1A, 1B, or 1C.

b) Grout ANSI A 108.10.

- c. System IWC: Masonry or Concrete Walls, Mortar bed installation **SYS-IWC.**
 - 1) Use: Wet Exposure (Showers)
 - 2) Method: Cement Mortar.
 - 3) Detail Standard: TCA 221 Membrane, Metal Lath, 3/4" to 1 1/2" Scratch Coat and Epoxy Mortar Bed, Bond Coat, Tile, Epoxy Grout.
 - 4) Installation Standard:

a) Tile ANSI A 108.1B.
b) Epoxy Grout ANSI A 108.6.
c) Waterproof membrane ANSI A108.13.

- d. System IWD: Gypsum Board Wall, thin-set installation SYS-IWD.
 - 1) Use: Dry Exposure.
 - 2) Method: Dry-Set or Latex-Portland Cement Mortar.
 - 3) Detail Standard: TCNA W243 Water Resistant Gypsum Board, 3/32" Thin-Set Dry-Set or Latex-Portland Cement Mortar, Bond Coat, Tile, Grout.
 - 4) Installation Standard:

a) Tile ANSI A 108.5.b) Grout ANSI A 108.10.

- e. System IWE: Wood Stud Walls, mortar bed installation SYS-IWE.
 - 1) Use: Dry or Wet Exposures (Kitchen, Toilets and Showers).
 - 2) Method: Cement Mortar.
 - 3) Detail Standard: TCNA W231 Cleavage Membrane, Metal Lath, 3/4" to 1-1/2" Scratch Coat and Mortar Bed, Bond Coat, Tile, Grout.
 - 4) Installation Standard:

a) Tile ANSI A 108.1B.
b) Grout ANSI A 108.10.
c) Waterproof membrane ANSI A108.13.

- f. System IWF: Metal Stud Walls, mortar bed installation SYS-IWF.
 - 1) Use: Dry or Wet Exposure (Kitchen, Toilets and Showers).
 - 2) Method: Cement Mortar.
 - 3) Detail Standard: TCNA W241 Cleavage Membrane, Metal Lath, 3/4" to 1" Scratch Coat and Mortar Bed, Bond Coat, Tile, Grout.
 - 4) Installation Standard:

a) Waterproof membrane ANSI A108.13.

b) Cured Mortar Bed.

c) Tile ANSI A 108.1B.
 d) Grout ANSI A 108.10.

- 3. Exterior Wall:
 - a. System EWA: Masonry or Concrete Walls, 3/4" to 1" mortar bed installation SYS-EWA.
 - 1) Use: Dry or Wet Exposure.
 - 2) Method: Cement Mortar.
 - 3) Detail Standard: TCNA W201 Wall Membrane, Metal Lath, 3/4" To 1" Scratch Coat/Mortar Bed, Bond Coat, Tile, Grout.
 - 4) Installation Standard:

a) Waterproof Membrane
b) Tile
c) Grout
ANSI A 108.13.
ANSI A 108.1B.
ANSI A 108.10.

- b. System EWB: Solid Backing Walls, 3/8" to 3/4" reinforced mortar bed **SYS-EWB**.
 - 1) Use: Dry or Wet Exposure.
 - 2) Method: Cement Mortar.
 - 3) Detail Standard: TCNA W221 Wall Membrane, Metal Lath, 3/8" To 3/4" Scratch Coat/Mortar Bed, Bond Coat, Tile, Grout.
 - 4) Installation Standard:
 - a) Waterproof Membrane ANSI A108.13.
 - b) Tile ANSI A 108.1A, 1B, or 1C A108.1B is required if waterproof membrane or epoxy bond coat is to be used.
 - c) Grout ANSI A 108.10.
- c. System EWC: Metal Stud Walls, 3/4" to 1" mortar bed, exterior walls **SYS-EWC**.
 - 1) Use: Dry or Wet Exposure.
 - 2) Method: Cement Mortar.
 - 3) Detail Standard: TCNA W241 Wall Membrane, Metal Lath, 3/4" To 1" Scratch Coat/Mortar Bed.
 - a) At exterior Tile locations include: Bond Coat, Tile, Grout.
 - 4) Installation Standard:
 - a) Waterproof Membrane ANSI A108.13.

- b) Tile ANSI A 108.1A, 1B, or 1C A108.1B is required if waterproof membrane or epoxy bond coat is to be used.
- c) Grout ANSI A 108.10.

4. Sealer Application:

- a. For tile and grout sealers, follow manufacturer's written recommendations and procedures, at application rates recommended by the label on the material container.
- b. Apply penetrating grout sealer and cure in accordance with tile manufacturer's written recommendations for the resistance of moisture penetration into the grout surface.
- c. For Stone Tile and Stone Grout sealers, apply at a rate of 500 to 1,500 sq. ft. per coat per gallon, depending on type of stone (slate), porosity and texture of the surface, temperature, humidity and method of application.
- d. For exterior Stone Tile applications, provide two coats of sealer per manufacturer's written recommended rate of application, allowing the proper time between coats for curing (30 minutes) as recommended by the manufacturer.
 - 1) Protect newly coated surface from traffic and moisture for a period of twelve hours.

F. Curing:

- 1. Apply Curing Sheet over all tiled surfaces.
 - a. Lap sheets 4 inches minimum and seal against escape of moisture.
 - b. Leave Curing Sheets in place a minimum of 3 days.

3.4 CLEANING

- A. Clean in accordance with Specification Section PROJECT CLOSEOUT.
 - 1. Clean any soiled surfaces immediately.
 - 2. Finish shall be clean and ready for the application of any additional finishes.
 - 3. In accordance with manufacturer's written instructions and recommendations.
 - 4. Wash down cured tile work with cleaner mixed and applied in accordance with manufacturer's written instructions.
 - 5. Rinse tile-work thoroughly, with clean water, and polish with soft-cloth.
- B. Cleaning, Removal, Replacement and Repointing of Existing Tile:
 - 1. Clean all existing tile and grout of all dirt, oils and graffiti.
 - 2. Remove all existing tile which has been damaged, cracked, drilled, or otherwise disfigured from its original shape and installation (including Graffiti which can not be cleaned off).
 - a. Provide in the Base Bid for an ALLOWANCE of 100 sq. ft. maximum of tile areas selected by the Architect (excluding expected tile replacement for blocking or new walls) for additional work required to complete the modernization.
 - 3. Repoint all grout conditions subject to tile removal and replacement, and repoint all grout conditions where the existing grout has been damaged, cracked, drilled, or otherwise disfigured from its original shape and installation. Repoint with Latex-Portland Cement Mortar.
 - 4. Install new tile in locations subject to tile removal. Install tile colors (maximum of 4 color choices) in locations selected by the Inspector and Architect.

3.5 PROTECTION

A. Protection from weather:

1. Protect newly installed work from freezing for 24 hours after erection, installation or application.

B. Protection from traffic:

- 1. Prohibit all foot and wheel traffic from using newly tiled floor for at least 3 days.
- 2. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 095000 - ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Acoustical Ceiling Materials, Suspension Systems, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 05 12 00 STEEL AND FABRICATIONS
 - 4. 06 10 00 ROUGH CARPENTRY
 - 5. 07 21 00 INSULATION
 - 6. 09 24 00 CEMENT PLASTER
 - 7. 09 29 00 GYPSUM BOARD
 - 8. 09 72 00 WALL COVERINGS
 - 9. 09 91 00 PAINTING
 - 10. 10 05 00 MISCELLANEOUS SPECIALTIES
 - 11. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

- A. Standards:
 - 1. In accordance with the following standards:
 - a. CISCA Ceilings & Interior Systems Construction Association.

1.3 SYSTEM DESCRIPTION

- A. Suspension System Design Requirements: In accordance with allowable values and properties assigned and approved by CBC.
 - 1. Heavy Duty in accordance with ASTM C 635 "Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and lay-in Panel Ceilings," ASTM E 580 "Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint," Section 5.1, ASCE 7 as modified by CBC Sections 1617A.1.20, 2506.2.1, and IR 25-2.13.
 - 2. Design Weight: Total Weight does not exceed four (4) pounds per square foot, including air conditioning grilles and light fixtures.
 - 3. System is not to support lateral loads from partitions.
 - 4. Fasteners must be capable of sustaining, without failure, hanger wires with 200 lbs. tension load and bracing wires with 440 lbs. tension load.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - a. Manufacturers Product Information for each type of Acoustical Ceiling Tile or Panel scheduled to be used.
 - b. Manufacturers Product Information for each component of the Suspension System specified or scheduled.
 - 2. Shop Drawings.
 - a. Submit shop drawings from manufacturer detailing ceiling suspension system assemblies and indicating dimensions, method of field assembly (including hanger and bracing wires, compression struts, wall angle attachments), other components, and location and detail of each suspension system grid connection.
 - 1) Submit drawings showing details of Hanger Wires, Brace Wires, expansion joint locations, and Compression Strut connections to structure and to suspension system.
 - 3. Samples.
 - a. Provide 4 to 6 inch square sample for each type of Acoustical Ceiling Tile or Panel scheduled to be used.
 - b. Provide 12 inch lineal sample of Suspension System components for each type of system specified or scheduled.
 - 4. Quality Assurance/Control Submittals:
 - a. Test Reports:
 - 1) Tension Tests of acoustical ceiling wire anchors provided by Testing Agency.
 - b. Certificates:
 - 1) General Construction: Certification signed by the Contractor on Contractor's letterhead.
 - 2) Certificates signed by manufacturers of Acoustical Ceiling components certifying that their products comply with specified requirements.
 - c. Manufacturer's Written Instructions:
 - 1) Manufacturer's written instructions showing their suspension grid installation methods.
 - 5. Closeout Submittals in accordance with the following:
 - a. In accordance with Specification Section PROJECT DOCUMENTS.
 - b. Warranty in accordance with Specification Section WARRANTIES.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Material Qualifications:
 - a. Where fire-rated Acoustical Ceiling assemblies are indicated, provide materials and construction identical to those of assemblies tested for fire resistance per UL or ASTM E 119 "Test Methods for Fire Tests of Building Construction and Materials," by an independent testing and inspecting agency acceptable to the California State Fire Marshal.
 - b. Source Limitations:
 - 1) Acoustical Ceiling Tiles or Panels: Obtain each type through one source from a single manufacturer.
 - 2) Suspension Systems: Obtain each type through one source from a single manufacturer.

2. Installer Qualifications:

- a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - 1) Helpers and apprentices used for such work shall be under full and constant supervision at all times by thoroughly skilled Acoustical Ceiling and Suspension System installers.
 - 2) In the acceptance or rejection of installed Acoustical Ceiling or Suspension Systems, no allowance will be made for lack of skill on the part of the installers.

3. Manufacturer/Supplier Qualifications:

- a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- b. Products, materials and evaluation reports to comply with IR-A5.

B. Regulatory Requirements:

- 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. CBC California Building Code (CBC 803.1.1)
 - c. CSFM California State Fire Marshal.
 - d. FDA Food and Drug Administration, a department of US Department of Health and Human Services.
 - e. IR Interpretation of Regulations.
 - f. USDA/FSIS United States Department of Agriculture., Food Safety and Inspection Service.

C. Certificates:

- 1. General Construction: Contractor to certify that work provided, meets or exceeds the requirements of this section.
- 2. Products: Manufacturers of Acoustical Ceiling components shall certify that their products comply with specified requirements.

D. Meetings:

- 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:

1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:

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

C. Storage and protection:

1. Products shall be stored in a fully enclosed, conditioned space and protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination and other causes.

1.7 PROJECT CONDITIONS

A. Environmental requirements:

- 1. Do not install acoustical ceilings until spaces are enclosed and weatherproof.
- 2. Wet work and dry work in spaces is completed, dry and dust free.
- 3. Work above ceilings is completed.
- 4. Ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Existing Conditions:

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

1.8 SEQUENCING AND SCHEDULING

A. Coordination:

1. Coordinate layout and installation of Acoustical Ceiling Tiles, Panels and the Suspension Systems with other construction that penetrates ceilings or is supported, including light fixtures, HVAC equipment, smoke monitoring and fire-suppression systems.

1.9 WARRANTY

A. Contractor's General Warranty:

1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:

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

C. Installer's Warranty:

1. In accordance with the terms of the Specification Section - WARRANTIES:

a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products specified are from companies listed below, or approved equivalent. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers listed as acceptable alternative manufacturers must still comply with the requirements of the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified Tile and Panel product manufacturer:
 - a. ARMSTRONG WORLD INDUSTRIES.
 - b. Acceptable alternative manufacturers:
 - 1) CERTAINTEED.
 - 2) UNITED STATES GYPSUM COMPANY, USG INTERIORS.
 - 2. Specified Suspension System product manufacturer:
 - a. ARMSTRONG WORLD INDUSTRIES.
 - b. Acceptable alternative manufacturers:
 - 1) CHICAGO METALLIC CORPORATION.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Tile or Panel:
 - General:
 - a. Standard: Provide manufacturer's standard tile or panels of configuration indicated that comply with ASTM E 1264 "Standard Classification for Acoustical Ceiling Products" classifications as designed by type, pattern, acoustical rating, light reflectance, and fire-rating, unless otherwise indicated.
 - b. Colors and Patterns: Match appearance characteristics indicated for each product type.
 - c. Antimicrobial Treated:
 - 1) Coating-Based: Provide tile or panel face surfaces (front and back) with coated antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273 "Standard Test method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber."
 - 2) Panel-Base: Provide tiles or panels treated with manufacturers standard antimicrobial solution that inhibits fungus, mold, mildew, gram-positive and gram-negative bacteria.
 - 2. See the Acoustical Tile and Panel Schedule at the end of this section for specified tile or panel types.
- B. Suspension Systems:
 - 1. General:

- a. Classification of Suspension System Grid is Heavy Duty in accordance with ASTM C 635 "Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and lay-in Panel Ceilings," ASTM E 580 "Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint," Section 5.1, ASCE 7 as modified by CBC Sections 1617A.1.20, 2506.2.1, and IR 25-2.13.
- b. Provide Underwriter's Laboratory (UL) design number or California State Fire Marshal (CSFM) Listing number for the fire-rated ceiling assembly.
 - The components and installation details must conform in every respect with the UL or CSFM approval for the design number specified.
 - 2) Custom designs which combine components from different approval designs but have not been tested as a complete assembly are not acceptable.
 - See Exposed Grid at end of this section for specified system numbers.

2. Wire:

- a. Soft temper, Class 1 zinc coating, in accordance with ASTM A 641 "Specification for Zinc-Coated (Galvanized) Carbon Steel Wire."
 - 1) Hanger: 12 gage (0.106 inch diameter).
 - 2) Brace: 12 gage (0.106 inch diameter).

3. Clip Attachments:

3)

- a. General: Fabricate from corrosion-resistant material with holes or loops for attaching hanger and brace wires.
 - 1) Ceiling Clips: 3/4" wide x 13 gage, galvanized steel.
 - 2) Steel Straps:
 - a) 1" wide x length as required, 12 gage galvanized steel.
 - b) 3" wide x 4" long x 12 gage galvanized steel.

4. Grid:

- a. Grid System shall be manufactured from commercial quality galvanized steel.
- b. All Tee Grid System Numbers are from ARMSTRONG WORLD INDUSTRIES.
 - 1) Exposed Non-Rated 15/16" Tee Grid System "Prelude XL" (P-XL).
 - 2) Exposed Fire-Rated 15/16" Tee Grid System "Prelude XL Fire Guard" (P-XL).
 - 3) Exposed Non-Rated 9/16" Tee Grid System "Suprafine XL" (S-XL).
- c. Main Runners:
 - 1) Main Runner Non-Rated 15/16" #P-XL 7301.
 - 2) Main Runner Fire-Rated 15/16" #P-XL 8301.
 - 3) Main Runner Non-Rated 9/16" #S-XL 7501.
 - 4) Capped, Double-Web roll-formed from cold-rolled steel sheets, pre-painted with factory punched cross runner slots, hanger holes and integral bayonet style and couplings.
 - 5) Fire-rated: Manufactured with fire-expansion reliefs.
- d. Cross Runners:
 - 1) 2' Non-Rated Cross Runner 15/16" #P-XL 7328.
 - 2) 4' Non-Rated Cross Runner 15/16" #P-XL 7341.
 - 3) 2' Fire-Rated Cross Runner 15/16" #P-XL 8323.
 - 4) 4' Fire-Rated Cross Runner 15/16" #P-XL 8341.
 - 5) 2' Non-Rated Cross Runner 9/16" #S-XL 7520.
 - 6) 4' Non-Rated Cross Runner 9/16" #S-XL 7540.
 - 7) Capped, Double-Web roll-formed from cold-rolled steel sheets, pre-painted with factory punched cross runner slots and hanger holes.
 - 8) Fire-rated: Manufactured with fire-expansion reliefs.
- e. Wall Angles:
 - 1) "Angle" Ceiling Edge Trim, hemmed exposed edges, 7/8" x 7/8", #7800.
 - 2) Roll-formed of sheet metal of same gage and finish as the main runners.

- 3) Provide wall angles fabricated to diameter required to fit circular penetrations of ceilings exactly.
- f. Panel Hold Down Clips:
 - 1) Hold Down Clip #P-XL 414.
- g. Compression Struts (Metal angles, galvanized steel):
 - 1) 1/8 inch thick x 1 inch x 1 inch 800 lbs./1000 feet weight.
 - 2) 3/16 inch thick x 1-1/4 inch x 1-1/4 inch 1,480 lbs./1000 feet weight.
 - 3) 3/16 inch thick x 1-1/2 inch x 1-1/2 inch 1,800 lbs./1000 feet weight.
 - 4) 3/16 inch thick x 1-3/4 inch x 1-3/4 inch 2,120 lbs./1000 feet weight.
 - 5) 3/16 inch thick x 2 inch x 2 inch 2,440 lbs./1000 feet weight.
 - 6) 3/16 inch thick x 2 inch x 2-1/2 inch 3,070 lbs./1000 feet weight.
 - 7) 3/16 inch thick x 3 inch x 3 inch 3,710 lbs./1000 feet weight.
 - 8) 1/4 inch thick x 3-1/2 inch x 3-1/2 inch 5,800 lbs./1000 feet weight.
 - 9) 1/4 inch thick x 4 inch x 4 inch 6,600 lbs./1000 feet weight
 - 10) Alternate Compression Struts Refer to drawings.
 - a) Must be submitted to and approved by **DSA**.
- h. Seismic Clips:
 - 1) Seismic Perimeter Clips #BERC2.
- i. Cold Rolled Channels, 16 gage galvanized steel:
 - 1) 1-1/2" x 17/32" flange 475 lbs/1000 feet weight.

2.3 ACCESSORIES

A. Fasteners:

- 1. Wood Construction:
 - a. Provide corrosion-resistant materials.
 - b. Eye screws, minimum 1/4 inch diameter, 1-1/4 inch minimum embedment.
 - c. Staples, 1-1/2 inch x 0.148 inch diameter (9 gage).
 - d. Nails, STRONGHOLD "J" nails.
- 2. Steel Framing:
 - a. Shot-in Anchors.
- 3. Metal Deck or Metal Deck without Structural Concrete:
 - a. Self-tapping Screws.
- 4. Metal Deck or Metal Deck with Structural Concrete or Concrete:
 - a. Shot-in Anchors (hanger wire only).
 - b. Drilled-in Anchors.
- 5. Suspension System Fasteners, runner to wall angle:
 - a. Pop rivets as standard with the manufacturer, heads to match the finish of the main runners.
 - Pop-rivets, screws or other attachments are not acceptable unless specifically detailed on the manufacturer's drawings and approved by UL and the CSFM.

B. Adhesives:

1. Provide adhesives that comply with all requirements of ASTM D 1779 "Standard Specification for Adhesive for Acoustical Materials," for non-rated and fire-rated assemblies, and shall be compatible with the substrate to which the tile is to be installed as well as the tile material selected, and shall be UL Labeled for Class 0 - 25 Flame Spread..

C. Sealants:

- Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C 834 "Specification for Latex Sealants," and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90 "Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements."
- 2. Acoustical Sealant for Concealed Joints: Manufacturer's standard non-drying, non-hardening, non-skinning, non-staining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.
- D. Other Materials: All other miscellaneous materials, not specifically described, but required for a complete and proper installation of acoustical ceilings, shall be as selected by the Contractor subject to the approval of the Architect.

2.4 FINISHES

A. Factory Finish:

- 1. Suspension System: Manufacturer's standard baked-on enamel finish to all members. All fasteners shall match the main runner finishes.
 - a. General: Comply with NAAMM's "Metal Finishes manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- 2. Tile or Panel: Refer to Tile and Panel Schedule for finishes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

- Prior to the execution of the work under this specification section, examine substrates, areas, and conditions, including structural framing to which acoustical 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 ceilings.
- 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
- 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

- 1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.
- 2. Coordinate proper placement of ceiling mounted tracks, accessories, light fixtures, HVAC registers and other items which are to be integrated with acoustical ceilings.
- 3. Measure each ceiling area and establish layout of acoustical tiles or panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles or panels at borders, and comply with layout shown on reflected ceiling plans.

B. Protection:

1. Do not begin work until all rooms have been protected against the weather.

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

C. Surface preparation:

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

3.3 INSTALLATION

A. General:

- 1. In accordance with manufacturer's written instructions and recommendations along with CISCA's "Ceiling Systems Handbook" and USDA.
- 2. In accordance with approved Submittals.
- 3. In accordance with Regulatory Requirements.
- 4. Installation shall comply with ASTM C 636 "Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels," and ASTM E 580 "Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint," Section 5.2.
- 5. Installation shall also comply with CBC Section 1617A.1.20, 2506.2.1, and R 25-2.13.

B. Layout:

- 1. Lines shall be straight and true.
- 2. Set plumb, level, and square.

C. Suspension System:

- 1. 12 gage (minimum) hanger wires may be used for up to and including 4'-0" x 4'-0" grid spacing and attached to main runners. Splices will not be permitted in any hanger wires unless specifically approved by **DSA/SSS**.
- 2. Provide 12 gage hanger wires at ends of all main and cross runners within 8" from the support or within 1/4 of the length of the end tee, whichever is least, for the perimeter of the ceiling area.
 - a. End connections for runners, which are designed and detailed to resist the applied horizontal forces may be used in lieu of the 12 gage hanger wires subject to DSA/SSS review and approval.
 - b. Perimeter wires are not required when the length of the end tee is 8" or less.
- 3. Provide trapeze or other supplementary support members at obstructions to maintain hanger spacing.
 - a. Provide additional hangers, struts or braces as required at all ceiling breaks, soffits or discontinuous areas.
 - b. Hanger wires that are more than 1 in 6 out of plumb are to have counter-sloping wires.
- 4. Ceiling grid members may be attached to not more than 2 adjacent walls. Ceiling grid members should be at least 3/4 inch free of other walls.
 - a. If walls run diagonally to ceiling grid system runners, one end of main and cross runners should be free and a minimum of 3/4 inch clear of wall.
 - b. Pop rivets, screws, or other attachments in fire-rated ceilings shall not be acceptable unless specifically detailed on the manufacturer's drawings and approved by UL and **DSA/FLS**.
- 5. At the perimeter of the ceiling area where main or cross runners are not connected to the adjacent wall, provide Seismic Perimeter Clip, installed in accordance with manufacturer's instructions and ICC-ES Evaluation Report.

- 6. Provide bracing assemblies consisting of a compression strut and slotted angle spacer of four (4) 12 gage splayed bracing wires oriented 90 degrees from each other.
 - a. Bracing assemblies shall be provided for each **144** square feet of ceiling area.
 - Spaced not more than **12** feet by 12 feet on center.
 - b. Bracing assemblies shall be located not more than 1/2 the above spacing from each perimeter wall or at the edge of vertical ceiling offsets.
 - c. The slope of these wires should not exceed 45 degrees from the plane of the ceiling and should be taut without causing the ceiling to lift.
 - d. Splices in bracing wires are not permitted unless specifically approved by **DSA/SSS**.
 - e. Fire-Rated Asemblies shall have a bracing assembly for each 96 square feet.
 - 1) The first bracing assembly is required not more than four feet (4'-0") from each wall.
 - 2) A minimum of one bracing assembly is required between any two adjacent expansion cut-outs on runners being braced.
 - f. Bracing assemblies are not required where the ceiling area is:
 - 1) 144 sq.ft. or less.
- 7. Fasten hanger wires with not less than 3 tight turns. Fasten bracing wires with 4 tight turns.
 - a. Make all tight turns within a distance of 1-1/2 inches.
 - b. Hanger or bracing wire anchors to the structure should be installed in such a manner that the direction of the wire aligns as closely as possible with the direction of the forces acting on the wire.
- 8. Separate all ceiling hanging and bracing wires at least 6 inches from all unbraced ducts, pipes, conduit, etc.
 - a. It is acceptable to attach lightweight items, such as single electrical conduit not exceeding 3/4" nominal diameter, to hanger wires using connectors acceptable to **DSA/SSS**.
- 9. Attach all light fixtures and ceiling mounted air terminals or services to the ceiling grid runners to resist a horizontal force equal to the weight of the fixtures.
 - a. Approved screws or fasteners are required.
- 10. Flush or recessed light fixtures weighing less than 56 pounds and mechanical terminals and services weighing less than 20 lbs. 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.
 - a. All 4 ft. x 4 ft. fixtures must have slack safety wires at each corner.
- 11. All flush or recessed light fixtures weighing 56 pounds or more and mechanical terminals and services weighing 20 lbs. or more shall be independently supported by not less than four (4) taut #12 gage wires each attached to the fixture.
 - a. Wires and their attachment to the structure must be capable of supporting 4 times the weight of the unit and attached to the structure above regardless of the type of ceiling grid system used.
- 12. Support surface mounted light fixtures by at least two positive devices which surround the runner and which are each supported from the structure above with 12 gage wire.
 - a. Spring clips or clamps that connect only the runner are not acceptable.
 - b. Provide additional supports when light fixtures are 8'-0" or longer.
- 13. Support pendant mounted light fixtures directly from the structure above with hanger wires or cables passing through each pendant hanger and capable of supporting four (4) times the weight of the fixture.
 - a. Bracing assembly is required where the pendant hanger penetrates the ceiling.
 - b. Pendant hanger is required to attach to the bracing assembly to transmit horizontal forces.
 - c. Maximum spacing between supports shall not exceed 8 feet.
- 14. Ceiling Edge Condition:

- a. Where Grid System abuts wall, fasten wall angles to framing in wall structure.
 - 1) At Wood Framing, attach to backing with No. 10 x 3" Screws at 16" o.c.
 - 2) At Metal Framing, attach to metal framing backing with No. 8 self-tapping sheet metal screws at 16" o.c.
- b. Where Grid System terminates free from wall, fasten wall angles to Grid system with Fasteners. No screw or rivets shall appear on any exposed surface.

15. Supplemental Support Members:

- a. Where the width of ducts or other obstructions interfere with typical hangers and bracing assemblies, provide and install supplemental members and hangers in the form of trapeze or equivalent devices.
- b. Provide additional hangers, struts, or braces at all ceiling breaks, soffits, or discontinuous areas.
- c. Hanger wires that are more than one (1) horizontal in six (6) vertical shall have counter-sloping wires.

16. Expansion Joints:

- a. Expansion Joints shall be provided and installed in the ceiling at intersections of corridors and junctions of corridors with lobbies or other similar areas.
- 17. Expansion Joints shall be provided and installed in ceiling areas exceeding 2,500 sq.ft. in order to separate ceilings into areas not exceeding 2,500 sq.ft.

D. Suspended Acoustical Ceiling Panels:

- 1. Install acoustical ceiling panels with undamaged edges and fit accurately into suspension system runners and wall angles. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
 - a. Install panels with pattern running in one direction.
- 2. Paint cut edges of panels remaining exposed after installation.
 - a. Match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical ceiling manufacturer.
- 3. Install hold down clips at all Fire-Rated acoustical ceiling assemblies, food preparation areas, and at locker/shower areas.
- 4. 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 two (2) inch oversized ring, sleeve, or adapter through the ceiling tile to allow free movement of one (1) inch in all horizontal directions. Alternatively, swing joints may be provided per ASTM E 580, Section 5.2.8.5.

E. Adhesively applied Acoustical Tiles:

 Installation shall comply to ASTM D 1779 "Standard Specification for Adhesive for Acoustical Materials."

3.4 FIELD QUALITY CONTROL

A. Site Tests:

- 1. Testing Agency: The Owner's Testing Laboratory Agency shall perform field tests and Inspections and prepare test reports.
 - a. Testing and inspecting of completed installations of acoustical ceiling fasteners and anchors shall take place in successive stages, in areas of extent and using methods as follows.
 - b. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
- 2. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed:
 - a. Concrete Anchors:

- 1) Must be capable of sustaining, without failure, a load equal to 200 lbs. tension for hanger wires and 440 lbs. tension for bracing wires by construction as determined by testing according to ASTM E 488 "Test methods for Strength of Anchors in Concrete and Masonry Elements," by a qualified independent testing agency.
 - a) Hanger Wire Anchors 1 in 10 must be field tested.
 - b) Bracing Wire Anchors 1 in 2 must be field tested.
- 3. Remove and replace acoustical panel ceiling hangers where test results indicate that they do not comply with specified requirements.
- 4. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 - a. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

B. Inspection:

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

3.5 CLEANING

- A. Clean in accordance with Specification Section PROJECT CLOSEOUT.
 - 1. Clean any soiled surfaces immediately.
 - 2. Clean any soiled surfaces at the end of each day, minimum.
 - 3. Finish shall be clean and ready for the application of any additional finishes.
- B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturers written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.6 SCHEDULES

- A. Tile and Panel Schedule:
 - 1. TYPE ACT-I:
 - a. Design "Kitchen Zone" No. 672.
 - b. Manufacturer ARMSTRONG WORLD INDUSTRIES.
 - c. Material:
 - Wet-Formed mineral fiber, with factory-applied vinyl latex paint surface finish
 - d. Size 24" x 48" x 5/8" panel "Square Cut" lay-in edge.
 - e. Mounting 15/16" Non-Rated exposed tee grid.
 - f. NRC Rating N/A.
 - g. CAC 30.
 - h. Light Reflectance per ASTM E 1477 "Test method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers":
 - i. ASTM Classification per ASTM E 1264 "Classification for Acoustical Ceiling Products":
 - 1) Type IX, Form 2, Pattern G.

- j. Class A per ASTM E 84 "Test method for Surface burning Characteristics of Building Materials":
 - 1) Flame Spread Index 25 or under.
 - 2) Smoke Density Developed Index 50 or less.
- k. Color "White."
- 1. Antimicrobial Treatment Bio Block.

END OF SECTION

INTENTIONALLY LEFT BLANK

RESILIENT BASE AND ACCESSORIES

SECTION 096510 – RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Resilient Base and Accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 30 00 CAST-IN-PLACE CONCRETE
 - 4. 03 35 10 POLISHED CONCRETE FINISHING
 - 5. 06 10 00 ROUGH CARPENTRY
 - 6. 06 41 23 MODULAR CASEWORK
 - 7. 09 24 00 CEMENT PLASTER
 - 8. 09 29 00 GYPSUM BOARD
 - 9. 09 72 00 WALL COVERINGS
 - 10. 09 91 00 PAINTING
 - 11. 10 05 00 MISCELLANEOUS SPECIALTIES
 - 12. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

- 1. In accordance with Specification Section Regulatory Requirements, and the following standards:
 - a. ADAAG Americans with Disabilities Act Accessibilities Guidelines.
 - b. RFCI The Resilient Floor Covering Institute.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data:
 - a. For each type of resilient base and accessory indicated.
 - b. Manufacturer's full color range (including any standard and premium colors).
 - c. Design Data for all compounds, fillers, adhesives, etc.
 - 2. Samples.
 - a. Provide 6 inch linear samples of each piece of trim material specified.
 - 3. Quality Assurance/Control Submittals:
 - a. Manufacturer's Written Installation Instructions.
 - b. Certificate from resilient base installer that all products supplied for installation comply with local CARB regulations in the area where the project is located controlling the use of Volatile Organic Compounds (VOC's).
 - c. Statement of Installer's Qualifications.

RESILIENT BASE AND ACCESSORIES

- 4. Closeout Submittals in accordance with Specification Sections in Division One:
 - a. Maintenance Data (including recommended polish and buffing procedures) in accordance with Specification Section PROJECT CLOSEOUT.
 - b. Record Documents in accordance with Specification Section PROJECT DOCUMENTS.
 - c. Warranty in accordance with this Specification Section, and Specification Section WARRANTIES.

1.4 QUALITY ASSURANCE

A. Qualifications:

- 1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project, and is competent in the techniques required by the manufacturer.
- 2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:

- 1. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA) in the area where the project is located.
- 2. CBC California Building Code (CBC 804.1)

C. Meetings:

- 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
 - c. Review delivery, storage, and handling procedures.
 - d. Review Project Conditions.
 - e. Review subfloor preparation procedures.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 - 1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
- B. Acceptance at Site:

- 1. Products must be in manufacturer's original unopened containers with labels indicating brand name, type, color, and size.
- 2. Damaged products will not be accepted.

C. Storage and protection:

- 1. Products shall be stored in a dry, protected, interior area above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.
 - b. Maintain temperature in the storage space between fifty (50) degrees Fahrenheit and ninety (90) degrees Fahrenheit.
 - 1) Seven (7) days prior to installation, acclimate products to environmental requirements of the article titled PROJECT CONDITIONS of this specification section, and the Paragraph titled "Environmental Requirements."

1.6 PROJECT CONDITIONS

- A. Environmental requirements:
 - 1. Temperature: Maintain temperature in space to receive products at sixty-eight (68) degrees Fahrenheit for two (2) days prior, during, and two (2) days following installation.
 - a. After this period, maintain a temperature of not less than fifty-five (55) degrees Fahrenheit.
 - b. After installation, at no such time shall the temperature exceed eighty-five (85) degrees Fahrenheit.

B. Existing Conditions:

- 1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
- 2. Field Measurements:
 - a. Take and be responsible for field measurements as required.
 - b. Report any significant differences between field dimensions and drawings to the Architect.

1.7 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:

a. Rubber Baseb. TransitionsTwo (2) Years.Two (2) years.

- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES:
 - a. Warranty Period Two (2) Years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Rubber Base manufacturer:
 - a. MANNINGTON COMMERCIAL.
 - b. Acceptable alternative manufacturers:
 - 1) ROPPE CORPORATION.
 - 2. Transitions manufacturer:
 - a. MANNINGTON COMMERCIAL.
 - b. Acceptable alternative manufacturers:
 - 1) ROPPE CORPORATION.
 - 3. Underlayment Compound manufacturer:
 - a. ARDEX INCORPORATED.
 - b. Acceptable alternative manufacturers:
 - 1) CHEMREX.
 - a) A compatible bonding agent is needed for this product to adhere to the Vapor-Alkalinity Control System and be considered as equivalent.
 - 4. Crack and Joint Filler manufacturer:
 - a. ARDEX INCORPORATED.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. General:

- 1. Resilient base and accessories shall be of first quality and the product of one manufacturer.
- Stair Treads shall be slip resistant by achieving a minimum 0.6 or greater static
 coefficient of friction as recommended in Appendix A4.5 of the ADAAG by testing per
 ASTM D 2047 "Test method for Static Coefficient of Friction of Polish-Coated Flooring
 Surfaces as Measured by the James Machine."
- 3. Colors and patterns shall be selected from manufacturer's standard line (including premium) except as noted otherwise.
 - a. Stair treads, risers, and stringers shall be of the same color or matching color and product line.
- 4. All resilient base and accessories shall be impervious to water damage.

B. Rubber Base:

1. Shall comply with ASTM F 1861 "Standard Specification for Resilient Wall Base," for Type TS (Vulcanized Rubber), Group 1 (Solid and Homogeneous).

- a. Critical Radiant Flux shall be Class 1, not less than 0.45 W/sq.cm. per ASTM E
 648 "Test Method for Critical Radiant Flux of Floor Covering Systems Using a
 Radiant Heat Energy Source."
- 2. Base shall be Coved.
- 3. Base height shall be 4". Base Height in Room Multi-Purpose 100 to match to existing adjacent Base. Contractor to confirm height of in this location.
- 4. Thickness shall be 0.125".
- 5. Provide pre-formed inside and outside base corners from the same dye lot as the rubber base.

C. Transitions:

- 1. Include molding caps, dividers, edges, cove supports, feature strips, reducers, stair nosings, etc.
- 2. Shall be composed of Thermoplastic Vinyl throughout item.
 - a. Stair Nosings shall be Thermoplastic Rubber (Vulcanized Rubber).
- 3. Critical Radiant Flux shall be Class 1, not less than 0.45 W/sq.cm. per ASTM E 648 "Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source."
- 4. Shall comply to dimension requirements of section 4.5.2 (changes in level) and section 4.5.3 (carpet-edge trim) of the ADAAG.
- 5. Stair nosings shall provide color contrasting integral insert for the visually impaired as indicated.

2.3 ACCESSORIES

A. Underlayment Compound:

- 1. Provide free-flowing, self-leveling, pumpable, cement based compound (ARDEX K-15) for applications from 1 inch thick to feathered edges, 4000 psi minimum in accordance with ASTM C 109-modified for air cure only "Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens)."
 - a. ARDEX "K-15."

B. Crack and Joint Filler:

- 1. Provide low viscosity rigid polyurethane filler, tensile strength of 4,000 psi minimum, in accordance with ASTM D 638 "Test method for Tensile Properties of Plastics."
 - a. ARDEX "ARDIFIX".

C. Concrete Primer (if applicable):

1. Nonstaining type as recommended in writing by flooring manufacturer.

D. Adhesives:

- 1. Adhesive as recommended in writing by resilient base manufacturer.
 - a. Provide manufacturer's written recommended epoxy adhesive at all rubber stair accessories and rubber stair nosings.
- 2. Compatible with Vapor-Alkalinity Control System, if installed.
- 3. Shall comply with CARB requirements in the place where the project is located.
- 4. Shall be water and mildew resistant.
- 5. Shall bond to non-porous substrate surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

- 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affect the execution of work under this specification section.
- 2. Insure that all flooring has been installed, fitted close to the wall to provide even support to the resilient base, and to insure a tight, smooth fit along the floor.
- 3. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
- 4. Execution of work under this specification section shall constitute acceptance of existing conditions.

B. Concrete Subfloors:

- 1. Verify that concrete slabs comply with ASTMF 710 "Practice for Preparing Concrete Floors to Receive Resilient Flooring."
- 2. Verify that substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.
- 3. Verify that subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- 4. Evaluate the RH (Relative Humidity) and pH (Alkalinity) for compliance with adhesives and resilient tile manufacturer's written substrate preparation recommendations.
 - a. If a Vapor-Alkalinity Control System product has been installed to reduce water vapor emission or phosphates thereby negating the RH and pH Test Results, evaluate products for compatibility with adhesives and resilient base products.
- 5. Determine adhesion characteristics by performing bond tests recommended by the resilient base and accessory manufacturer.

3.2 PREPARATION

A. Coordination:

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

B. Protection:

1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work.

C. Surface preparation:

- 1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
- 2. Wall substrates to receive resilient base must be completely clean, dry, smooth and free of oil, grease, rust, paint, varnish, shellac, or any other foreign substance.
- 3. From floor substrates, remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that may contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the resilient base and accessory manufacturer.
 - a. If a Vapor-Alkalinity Control System has been installed, do not remove this system.

- 4. Fill all cracks, joints, etc. with a Crack and Joint Filler according to manufacturer's written instructions.
- 5. Install self-leveling underlayment compound at depressed or uneven floor conditions.
- 6. Vacuum clean substrates to be covered immediately before installation.
- 7. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.
- 8. Proceed only after unsatisfactory conditions have been corrected.
- 9. Perform manufacturer recommended bond test to verify adhesion of resilient base and accessory to substrate.
- 10. Apply any recommended primers over the leveling compounds or treated concrete slabs prior to the installation of any resilient base or accessory products if recommended by the manufacturer.

3.3 INSTALLATION

A. General:

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

B. Layout:

- 1. Lines shall be straight and true.
- 2. Refer to Floor Pattern Drawing(s) in the Interior Color Schedule for transitions in color.

C. Resilient Base installation:

- 1. For base installations on primed metal or enameled surfaces, provide manufacturer's written recommended co-adhesive method of installation applied to both surfaces with contact bond adhesive.
- 2. On dry, absorbent surfaces, the base shall be adhered with manufacturer's written recommended adhesive and firmly pressed to the walls.
- 3. 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.
- 4. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- 5. Tightly adhere resilient base to substrate throughout length of piece, with base in continuous contact with horizontal and vertical substrates.
- 6. Do not stretch resilient base during installation.
- 7. On masonry surfaces, or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- 8. Pre-molded Corners: Install pre-molded corners before installing straight pieces.
- 9. After the installation, remove all excess adhesive before it dries.
- 10. Allow adhesive to set firm for approximately 24 hours before washing or applying any pressure.

D. Transition installation:

- 1. Measure and trim to fit transition pieces prior to installing.
- 2. Use appropriate approved manufacturer written adhesives for each substrate.
- 3. After installation, immediately remove all excess adhesive before it dries.

3.4 CLEANING

A. Cleaning:

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

3.5 PROTECTION

A. Protection from traffic:

1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 096723 – RESINOUS FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 30 00 CAST-IN-PLACE CONCRETE
 - 4. 05 12 00 STEEL AND FABRICATIONS
 - 5. 08 70 00 HARDWARE
 - 6. 09 29 00 GYPSUM BOARD
 - 7. 09 91 00 PAINTING
 - 8. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

- A. Standards:
 - 1. In accordance with the following standards:
 - a. ISO International Organization for Standardization

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - a. Submit technical data, installation instructions, and general recommendations for each resinous flooring material required.
 - b. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
 - 1) For initial selection of colors and finishes for consideration, submit manufacturer's color charts showing full range of colors and finishes available.
 - 2. Samples.
 - a. Provide 4 inch square sample of each type, color and pattern selected, applied to a rigid backing, in color and finish as selected.
 - 3. Quality Assurance/Control Submittals:
 - a. Manufacturer / Supplier Qualifications.
 - b. Installer Qualifications and Certifications.
 - c. Certificates:
 - 1) Submit three (3) copies of certificates.
 - 2) Include ISO 9002 certification indicating that all materials, including primers, resins, curing agents, finish coats, aggregates and sealants are manufactured and tested as a registered quality system.

- d. Manufacturer's written Instructions:
 - 1) Submit three (3) copies of manufacturer's written instructions.
- 4. Closeout Submittals in accordance with the following:
 - Maintenance Data in accordance with Specification Section PROJECT CLOSEOUT.
 - b. Warranty in accordance with Specification Section WARRANTIES.

1.4 QUALITY ASSURANCE

A. Qualifications:

- 1. Manufacturer/Supplier Qualifications:
 - a. Single Source Responsibility: Obtain primary resinous flooring materials including vapor barrier, primers, resins, hardening agents, finish or sealing coats from a single source manufacturer with not less than ten (10) years of successful experience in manufacturing and installing principal materials described within this section.
 - b. Provide secondary materials only of type and from source recommended in writing by manufacturer of primary materials.
 - c. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- 2. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.

B. Regulatory Requirements:

- 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - b. CBC California Building Code (CBC 804.1 and CBC 11B-302.1).

C. Meetings:

- 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:

- 1. Products shall be factory pre-weighed and pre-packaged in single, easy to manage batches to eliminate on site mixing errors. No on-site weighing or volumetric measurements will be allowed.
- 2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:

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

C. Storage and protection:

- 1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.
- 2. Temperature of storage area shall be maintained between 60 and 85 degrees F.

1.6 PROJECT CONDITIONS

A. Environmental requirements:

1. Temperature: Maintain ambient temperature in space to receive products between sixty (60) degrees Fahrenheit and eighty-five (85) degrees Fahrenheit for seven (7) days prior, during, and seven (7) days minimum following installation. Inform the Owner of ambient temperature requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.

B. Existing Conditions:

- 1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
- 2. Concrete substrate shall be properly cured for a minimum of 30 days.
- 3. RH (Relative Humidity) and Alkalinity Test:
 - a. Shall control vapor transmission up to and including 100 percent readings per RH Testing of ASTM F 2170 "Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes."
 - b. Shall control alkalinity for a long term maximum resistance of pH 14 per pH Testing of ASTM F 710 "Preparing Concrete Floors to Receive Resilient Flooring."
- 4. Job area to be free of other trades during floor installation.

1.7 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - . Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES:

a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified Membrane (Moisture Control System) product manufacturers:
 - a. STONHARD, INC. "MVT."
 - b. Acceptable alternative manufacturers:
 - 1) GENERAL POLYMERS "AQUAMROR."
 - 2. Specified Resinous Flooring Type 1 product manufacturers:
 - a. STONHARD, INC. "STONSHIELD HRI."
 - b. Acceptable alternative manufacturers:
 - 1) GENERAL POLYMERS "TPM-115 U1."
 - 3. Specified Resinous Flooring Type 2 product manufacturers:
 - a. STONHARD, INC. "STONSHIELD URI."
 - b. Acceptable alternative manufacturers:
 - 1) GENERAL POLYMERS "FASTOP S-U1."
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Membrane (Moisture Control System):
 - 1. Two-component, high-solids, epoxy system designed to suppress excess moisture in concrete prior to an overlayment.
 - 2. Physical Properties:

a. Thickness: 15-16 mils.
b. Tensile Strength (ASTM D 638) 4,400 psi.
c. Percent Elongation (ASTM D 638) 12%.

- B. Resinous Flooring Type 1: **RF-1**:
 - 1. A nominal 3/16" thick system comprised of a penetrating two-component epoxy primer, three-component, epoxy undercoat, one coat of brightly colored, medium quartz silica aggregate broadcast and one (1) coat of high performance, two-component, clear epoxy sealer.
 - 2. Physical Properties: Provide flooring system in which physical properties of topping including aggregate, when tested in accordance with standards or procedures referenced below, are as follows:
 - a. Compressive Strength (after 7 days): 10,000 psi.
 - 1) Per ASTM C 579 "Test methods for Compressive Strength of Chemical Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes."
 - b. Tensile Strength: 2,000 psi.

- 1) Per ASTM C 307 "Test Method for Tensile Strength of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacings."
- c. Flexural Strength: 4,300 psi.
 - 1) Per ASTM C 580 "Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes."
- d. Flexural Modulus of Elasticity: 2.0 x 10⁶ psi.
 - 1) Per ASTM C 580 "Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes."
- e. Hardness Shore D Durometer): 85-90.
 - 1) Per ASTM D 2240 "Standard Test Method for Rubber Property Durometer Hardness."
- f. Bond Strength 100 percent concrete failure): 400 psi.
 - 1) Per ASTM D 4541 "Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers."
- g. Impact Resistant: 160 in.lbs.
 - 1) Per ASTM D 4226 "Test Methods for Impact Resistant of Rigid Poly Vinyl Chloride (PVC) Building Products."
- h. Abrasion Resistance (CS-17 wheel): 0.06 gm max weight loss.
 - 1) Per ASTM D 4060 "Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser."
- i. Coefficient of Friction per ASTM D 2047 "Test method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine":
 - 1) Standard Texture: 0.8.
 - 2) Medium Texture: 0.7.
- j. Flammability (extent of burning 0.25 inches max): Class I.
 - 1) Per ASTM D 635 "Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position."
- k. Thermal Coefficient of Linear Expansion: 1.3 x 10-5 in/inoC.
 - Per ASTM C 531 "Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings and Polymer Concretes."
- 1. Water Absorption: 0.1 percent.
 - 1) Per ASTM C 413 "Test Method for Absorption of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes."
- m. Heat Resistant Limitation:
 - 1) For continuous exposure: 140 deg. F.
 - 2) For intermittent spills: 200 deg. F.
- n. Cure Rate Allowance (at 77 deg. F, 24 hours for normal operations): 12 hours for foot traffic.
- o. VOC Content: Not to exceed 40 grams per liter.
- C. Resinous Flooring Type 2: **RF-2:**
 - 1. For extreme temperature fluctuations (at freezer / cooler, and oven areas).
 - 2. A nominal 1/4" thick system comprised of a high performance, four-component mortar consisting of urethane resin, curing agent, selected, medium graded aggregates and inorganic pigments sealed with a two-component, 100 percent solids, urethane coating.
 - 3. Physical Properties: Provide flooring system in which physical properties of topping including aggregate, when tested in accordance with standards or procedures referenced below, are as follows:
 - a. Compressive Strength (after 7 days): 5,000 psi.

- Per ASTM C 579 "Test methods for Compressive Strength of Chemical Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes."
- b. Tensile Strength: 1,000 psi.
 - 1) Per ASTM C 307 "Test Method for Tensile Strength of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacings."
- c. Flexural Strength: 2,000 psi.
 - 1) Per ASTM C 580 "Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes".
- d. Flexural Modulus of Elasticity: 1.1 x 10⁶ psi.
 - 1) Per ASTM C 580 "Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes."
- e. Hardness (Shore D Durometer): 80-84.
 - 1) Per ASTM D 2240 "Standard Test Method for Rubber Property Durometer Hardness."
- f. Bond Strength (100 percent concrete failure): 400 psi.
 - 1) Per ASTM D 4541 "Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers".
- g. Impact Resistant: 160 in.lbs.
 - 1) Per ASTM D 4226 "Test Methods for Impact Resistant of Rigid Poly Vinyl Chloride (PVC) Building Products."
- h. Abrasion Resistance (CS-17 wheel): 0.06 gm max weight loss.
 - Per ASTM D 4060 "Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser."
- i. Coefficient of Friction: Dependent on texture selection.
 - Per ASTM D 2047 "Test method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine."
- j. Flammability (extent of burning 0.25 inches max): Class I.
 - 1) Per ASTM D 635 "Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position."
- k. Thermal Coefficient of Linear Expansion: 1.3 x 10-5 in/in deg. F.
 - Per ASTM C 531 "Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings and Polymer Concretes."
- 1. Water Absorption: 0.01 percent.
 - 1) Per ASTM C 413 "Test Method for Absorption of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes."
- m. Heat Resistant Limitation:
 - 1) For continuous exposure: 200 deg. F.
 - 2) For intermittent spills: 250 deg. F.
- n. Cure Rate Allowance (at 77 deg. F, 24 hours for normal operations): 6 hours for foot traffic.

2.3 ACCESSORIES

- A. Joint Sealant Materials:
 - 1. Manufacturer's compatible joint sealant materials in compliance with standards specified within Specification Section SEALANTS.
 - a. STONHARD, INC. STONFLEX MP7.
 - b. Acceptable alternative manufacturers:

1) GENERAL POLYMERS: As recommended in writing by manufacturer, compatible with floor product.

B. Metal Trim:

- 1. Manufacturer's standard metal trim (cove strip), for terminating cove base.
- 2. Acceptable alternative manufacturers:
 - a. General Polymers: As recommended in writing by manufacturer, compatible with floor product.

2.4 FINISHES

- A. Color as selected by the Architect from manufacturer's standard colors.
- B. Textures: Provide appropriate texture as recommended in writing by the manufacturer.
 - 1. T-1: Texture that is appropriate for Restroom applications, unless otherwise noted.
 - 2. T-2: Texture that is appropriate for Kitchen applications, unless otherwise noted.
 - 3. T-3: Texture that is appropriate for Shower applications, unless otherwise noted.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

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

3.2 PREPARATION

A. Coordination:

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

B. Protection:

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

C. Surface preparation:

- 1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
- 2. Concrete subfloor shall be dry in accordance with RH and Alkalinity tests, as tested in accordance with Specification Section VAPOR-ALKALINITY CONTROL.
- 3. Chipping around existing floor drains & floor sinks shall be in accordance with coating manufacturer's written recommendations for proper interface of resinous flooring so there is no standing water around drains after the resinous flooring system is applied.
- 4. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

- a. Follow manufacturer's written recommendations using mechanical means (such as use of a scabbler, scarifier or shot blast machine) for removal of bond inhibiting materials such as curing compounds or laitance.
- 5. Remove any surface irregularities by lightly abrading and vacuuming the floor surface.
- 6. Control Joints:
 - a. After floor is blasted/prepared, pre-fill the joints with STONSET PM5 (or GENERAL POLYMERS equivalent) epoxy patching mortar.
- 7. Expansion Joints:
 - a. Mark expansion joint widths on walls where proposed base would cover the marks so that one can find them again after the floor is applied.

3.3 APPLICATION

A. General:

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

B. Layout:

1. Lines shall be straight and true.

C. Application:

- 1. Apply osmotic resistant grout to all slabs.
 - a. Troweled Mortar: Mix mortar material according to manufacturer's written recommended procedures.
 - 1) Primer: Mix and apply primer over properly prepared substrate with strict adherence to manufacturer's installation procedures and coverage rates.
 - a) Coordinate timing of primer application with application of troweled mortar to ensure optimum adhesion between resinous flooring materials and substrate
 - 2) Apply immediately after mixing.
 - 3) Pour a bead of material and rake out with a 1/2" x 1/2" V-notched rake.
 - 4) Apply the material at a thickness of 1/8".
 - 5) Roll the material with a spiked roller to release any entrained air and produce a smooth finish layer.
 - 6) Keep a wet edge so that each subsequent mix may be knit into the previous mix within a 20 minute period.
 - 7) Allow to cure for 24 hours in accordance with manufacturer's written recommendations.
 - 8) Prepare the membrane surface after curing by shot blasting to ensure proper adhesion. Edges and confined spaces must be ground with a diamond cup-stone. Once prepared, treat the membrane like a concrete surface.
- 2. Apply cove base and terminate to cove strip at +5" above finished floor for both coating types.

D. Resinous Flooring Type 1 application:

- 1. Primer: Mix and apply primer over properly prepared substrate with strict adherence to manufacturer's installation procedures and coverage rates.
 - a. Coordinate timing of primer application with application of Resinous Flooring Type 1 to ensure optimum adhesion between resinous flooring materials and substrate.

- 2. Mix Resinous Flooring Type 1 and then screed apply and trowel to a tightly closed finish.
- 3. Allow for at least an 8 hour cure.
- 4. Next, lightly grind the mortar Base.
- 5. Mix and apply the undercoat to the floor surface using a steel squeegee, followed by rolling with a looped roller.
- 6. Immediately broadcast aggregate using manufacturer's written recommended equipment and techniques into the freshly applied undercoat.
- 7. Allow at least 8 hours (or longer depending on manufacturers recommendations) to cure between coats.
- 8. Scrape and sweep the floor to remove all loose aggregate particles, then vacuum.
- 9. Mix and apply sealer with strict adherence to manufacturer's installation procedures, and the texture type selected by the Architect.
- 10. Allow the sealer to cure in accordance with the manufacturer's written recommendations.

E. Resinous Flooring Type 2 application:

- 1. Follow the detailed manufacturer's printed instructions mixing and applying Resinous Flooring Type 2.
- 2. Material shall be used immediately after mixing.
- 3. A "Screed Applicator" shall be used to distribute the mixed Resinous Flooring Type 2 onto the floor.
- 4. Notched finishing trowels and spiked rollers as recommended in writing by the manufacturer shall be used to smooth the surface of the material to the required thickness.
- 5. Texture aggregate shall then be broadcast into the wet mortar, in texture finish as selected by the Architect.
- 6. Allow to cure 6 8 hours and apply sealer coat.

F. Expansion Joints:

1. Once the floor has been applied and has cured, find the Expansion Joint marks on the wall and saw cut to the width of the joint and fill with STONFLEX PM7 (or GENERAL POLYMERS equivalent).

3.4 FIELD QUALITY CONTROL

A. Site Tests:

- 1. As required by Regulatory Requirements.
- 2. RH and Alkalinity Tests see Specification Section VAPOR-ALKALINITY CONTROL.
- 3. The right is reserved to invoke the following material testing procedure at any time, and any number of times during the period of flooring installation:
 - a. The Owner will engage the service of an independent testing laboratory to sample materials being used on the job site. Samples of material will be taken, identified and sealed, and certified in the presence of the Contractor.
 - 1) Testing laboratory will perform tests for any of the characteristics specified, using applicable testing procedures referenced herein, or if none referenced, in manufacturer's product data.
 - 2) If test results show materials being used do not comply with specified requirements, the Contractor may be directed by the Owner to stop work; remove non-complying materials; pay for re-testing; re-apply flooring materials to properly prepared surfaces which had previously been coated with unacceptable materials until the work is right.
- 4. Floor Thickness Verification:

a. At the owner's discretion and under his supervision, the contractor shall take plus or minus 1" random cores per 1,000 sq. ft. through the system into the substrate to verify proper system thickness. Cored areas less than specified thickness shall be removed and replaced or increased in thickness by the installing contractor, in a manner that does not affect the performance or integrity of the system. Cored areas which comply with the written recommended system thickness shall be built up to match the surrounding surface elevation prior to applying the seal coat(s). Cores taken and patched will be noticeable, therefore, cores should be taken from areas where aesthetics are less critical

B. Inspection:

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

3.5 CLEANING

- A. Clean in accordance with Specification Section PROJECT CLOSEOUT.
 - 1. Clean any soiled surfaces immediately using cleaning materials and procedures recommended in writing by resinous flooring manufacturer.
 - 2. DO NOT clean the epoxy floors for a period of seven (7) days after installation in order to allow proper curing of the epoxy floor systems for full resistance to chemicals.

3.6 PROTECTION

A. Protection from traffic:

- 1. Job area to be free of other trades for a period of twenty-four (24) hours after floor installation.
- 2. Protect resinous flooring materials from damage and wear during construction operation. Where temporary covering is required for this purpose, comply with manufacturer's written recommendations for protective materials and method of application.
- 3. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

SECTION 097200 - WALL COVERINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all materials, labor, equipment and services necessary to furnish and install all Wall Coverings, accessories, and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.
 - a. FRP Panel systems.
 - b. Vinyl Covered Tackboard Panel systems.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 06 41 23 MODULAR CASEWORK
 - 4. 09 24 00 CEMENT PLASTER
 - 5. 09 29 00 GYPSUM BOARD
 - 6. 09 50 00 ACOUSTICAL CEILINGS
 - 7. 09 65 10 RESILIENT BASE AND ACCESSORIES
 - 8. 10 28 13 TOILET ACCESSORIES
 - 9. 10 44 00 FIRE PROTECTION SPECIALTIES
 - 10. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
 - 2. Manufacturer/Supplier Qualifications:

a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:

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

1.4 DELIVERY, STORAGE, AND HANDLING

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

B. Acceptance at Site:

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

C. Storage and protection:

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

1.5 PROJECT CONDITIONS

A. Environmental requirements:

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

B. Existing Conditions:

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

1.6 SCHEDULING

A. Custom Graphic Wallcovering: Verify lead time with manufacturer. Assume no less than six week lead time from approved submittals.

1.7 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified FRP Panel product manufacturer:
 - a. SEQUENTIA, INC. with NUDO Aluminum Trim Accessories.
 - b. Acceptable alternative manufacturers:
 - 1) BP CHEMICALS with NUDO Aluminum Trim Accessories.
 - 2) MARLITE with NUDO Aluminum Trim Accessories.
 - 3) NUDO PRODUCTS, INC. with NUDO Aluminum Trim Accessories.
 - 2. Custom FRP Panel product manufacturer:
 - 3. Specified Vinyl Covered Tackboard product manufacturer:
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. FRP Panels:
 - Width
 Thickness
 0.090 inches.
 - 3. Fire Rating in accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials" (Class C):
 - a. Flame Spread Maximum 175.
 - b. Smoke Developed Maximum 270.
 - 4. Finish:
 - a. Pattern Pebble finish.
 - 5. Color as selected from manufacturer's full color palette (including standard, premium and custom colors).
 - 6. Accessories:

- a. Adhesive as recommended in writing by manufacturer that meets the CARB requirements of the place where the Project is located.
- b. Sealant.
 - 1) Set all perimeter J-Mold trim in a continuous bead of silicon sealant.
- 7. Aluminum Trim by NUDO PRODUCTS, INC.:
 - a. Provide inside, outside, division and edge trim moldings as required for the conditions present in the project.

b. Lengthsc. Thickness96 inches0.090 inch

d. Trim Shapes:

J-Mold NUDO A-28.
 Divider NUDO A-30.
 Inside Corners NUDO A-32.
 Outside Corners NUDO A-34.

e. Finish: Powder Coated, in colors to match the field color of the FRP Panels.

- B. Custom FRP Panels:
- C. Vinyl Covered Tackboard:

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

A. Coordination:

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

B. Protection:

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

C. Surface preparation:

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

3.3 INSTALLATION

A. General:

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

B. Layout:

1. Lines shall be straight and true.

3.4 FIELD QUALITY CONTROL

A. Inspection:

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

3.5 CLEANING

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

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 099100 - PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

- 1. Provide all material, labor, equipment and services necessary to furnish and install Painting, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.
 - a. Material and Equipment to be Painted: Paint all piping, unwrapped ductwork, electric conduits exposed to view. Prime and paint all factory finished mechanical and electrical equipment and accessories exposed to view.
 - b. Material and Equipment not to be Painted: Do not paint piping, ductwork, equipment and machinery located in attic spaces, above furred or suspended ceilings, in furred pipe or duct spaces. Do not paint factory finished equipment or machinery located in mechanical rooms or mechanical buildings, attics, furred or suspended ceilings.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 05 12 00 STEEL AND FABRICATIONS
 - 4. 06 41 23 MODULAR CASEWORK
 - 5. 07 60 00 SHEET METAL (Shop Priming)
 - 6. 07 72 00 ROOF ACCESSORIES
 - 7. 07 92 00 SEALANTS
 - 8. 08 11 00 METAL DOORS AND FRAMES
 - 9. 08 31 13 ACCESS DOORS AND FRAMES
 - 10. 08 33 00 COILING DOORS
 - 11. 08 70 00 HARDWARE
 - 12. 08 80 00 GLASS
 - 13. 09 24 00 CEMENT PLASTER
 - 14. 09 29 00 GYPSUM BOARD
 - 15. 09 50 00 ACOUSTICAL CEILINGS
 - 16. 09 65 10 RESILIENT BASE AND ACCESSORIES
 - 17. 09 67 23 RESINOUS FLOORING
 - 18. 10 05 00 MISCELLANEOUS SPECIALTIES
 - 19. 10 44 00 FIRE PROTECTION SPECIALTIES
 - 20. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

- 1. In accordance with the following standards:
 - a. CA-CHPS California High Performance Schools
 - 1) 2011-CA-CHPS Addendum.
 - b. MPI Master Painters Institute
 - 1) MPI Architectural Painting Specification Manual.
 - 2) MPI Maintenance Repainting Manual.

- a) MPI RSP Master Painters Institute Repaint Surface Preparation Standards, Chapter 6, Section 2.
- MPI Glossary.
- c. PDCA Painting and Decorating Contractors of America, latest edition of the Architectural Specification Manual, as prepared by Specification Services, Inc., Washington State Council of the PDCA.

1.3 DEFINITIONS

- A. The following definitions are just some of the more important definitions used within this section, and were taken from the MPI Glossary Manual, or used to simplify language used by the Architect. These definitions and others stated within the Manual apply for this Specification Section.
 - 1. Acrylic Latex An aqueous dispersion of acrylic resins.
 - 2. Acrylic Resin A/R Synthetic resins made by polymerizing esters of acrylic acid.
 - 3. A/U Aliphatic Urethane
 - 4. A/A/U Aliphatic Acrylic Urethane
 - 5. Blocking Sticking or bonding together of two painted surfaces that are in direct contact. Most often caused by stacking painted articles before dry or reaching a "block free" (or "non-blocking") stage.
 - 6. DFT Dry Film Thickness the depth or thickness of a coating in the dry state. Expressed in mils (1/1000 inch) or microns.
 - 7. DRY FALL A Fog Paint designed to be applied by spray and dries fast enough that the overspray will be a dry powder after falling a certain distance. The dust can then be swept or vacuumed up.
 - 8. ODFT "Overall Dry Film Thickness" the depth or thickness of a complete coating system in the dry state. Expressed in mils (1/1000 inch) or microns.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.
 - b. Material Safety Data Sheets will be turned over to the Owner in compliance with local rules and regulations, but will not be reviewed.
 - c. Materials Lists:
 - 1) Format in accordance with Article in this section titled "Paint Finish Schedule".
 - d. Additional submittals to substantiate proposed equivalent systems.
 - 2. Samples.
 - a. Brushouts: In accordance with Specification Section SUBMITTAL PROCEDURES.
 - b. For each color and finish selected provide paint brushouts showing color tint graduation of each coat to and including the final color coat.
 - 1) Selected colors and finishes:
 - a) Size: 8 1/2" x 11" boards.
 - b) Quantity: 3 boards of each color and finish.
 - c) Board material wherever possible and for transparent finishes shall be same as material to be finished. Opaque finishes may be on heavy card stock.
 - 3. Closeout Submittals in accordance with the following:

- a. Maintenance Data in accordance with Specification Section PROJECT CLOSEOUT.
- b. Project Documents in accordance with Specification Section PROJECT DOCUMENTS.
- c. Warranty in accordance with Specification Section WARRANTIES.

1.5 QUALITY ASSURANCE

A. Qualifications:

- 1. Material Qualifications:
 - a. Where possible (except for specified materials), paint materials shall be products of only one manufacturer.
 - b. All materials, preparation and workmanship shall conform to requirements of the specified edition of the Architectural Painting Specification Manual by the Master Painters Institute (hereafter referred to as the MPI Painting Manual), unless otherwise indicated.
 - c. Flame Spread Ratings in accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials":
 - 1) Paint finishes in required exit stairways, corridors and exitways must meet flame spread ratings as required by regulatory agencies.
 - 2) Class A Tunnel Test 0-25 for enclosed required exit stairways and other exit ways.
 - 3) No interior paint or wall finish will be permitted having a tunnel test in excess of 200. All paint materials must be certified that materials meet these requirements.
 - d. Manufacturer's Written Instructions One for the Architect, Contractor and the Owner:
 - 1) Submit three (3) copies of manufacturer's written instructions.
 - e. Compatibility:
 - 1) Paint materials and equipment shall be compatible in use.
 - 2) Finish coats shall be compatible with prime coat.
 - 3) Prime coats shall be compatible with surface to be coated.
 - 4) Tools and materials shall be compatible with coating to be applied.
 - f. Air Quality:
 - Paint materials and equipment used for application will comply with CARB Air Quality Control Standards in effect at the Project Site and at the time of application.
- 2. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - Only qualified journeypersons, as defined by local jurisdiction, shall be engaged in painting and decorating work. Apprentices may be employed provided they work under the direct supervision of a qualified journeyperson in accordance with trade regulations.
- 3. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- B. Regulatory Requirements:
 - 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. CAL/OSHA California/Occupational Safety and Health Act

- b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
- c. CBC California Building Code (CBC 803.1.1)
- C. Mockups: Provide a full-coat benchmark finish sample for each type of coating and substrate required for Architect's review. Duplicate finish of approved sample Submittals.
 - 1. Wall Finishes shall be at least 100 sq. ft., suitably marked "MOCKUPS" and protected for the duration of the construction Project.
 - 2. Small areas and items can be selected by the Contractor, suitably marked "MOCKUPS" and protected for the duration of the construction Project.
 - 3. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.
 - 4. Approved mockups (wall areas and small areas or items) may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Meetings:

- 1. Pre-Installation: Scheduled by the Contractor prior to the start of work.
 - a. Coordinate the work with all other related work.
 - b. Identify any potential problems that may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems that may impede issuance of warranties and guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been executed.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Acceptance at Site:

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

B. Storage and protection:

- 1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units, in a locked, clean and neat, well ventilated area.
 - a. All receiving, opening and mixing shall be done in this area.
 - b. Oily rags and waste shall be removed from area each night and all other precautions shall be taken to avoid danger of fire.
 - c. Empty containers shall not be removed from site, unless otherwise approved by the Architect.
 - d. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.7 PROJECT CONDITIONS

A. Environmental requirements:

- 1. Rain or Fog:
 - a. No work under this section shall be started or maintained under threat of rain.
 - b. Surfaces shall be painted only when they are free from moisture.
 - c. No painting of exterior surfaces shall be done less than 72 hours of actual drying weather after a rain or during periods of dew or fog.
 - d. Perform no painting or decorating work when the maximum moisture content of the substrate exceeds:
 - 1) 12 percent for concrete and masonry (clay and concrete brick / block).
 - 2) 15 percent for wood.
 - 3) 12 percent for plaster and gypsum board.
 - e. Perform no painting or decorating work when the relative humidity is above 85 percent or when the dew point is less than 5 degrees F variance between the air / substrate temperature.
- 2. Temperature: No painting shall be done when ambient air and substrate temperatures are below 50 degrees F.
- 3. Alkalinity: An alkali level of between 7.0 and 8.5 pH is suitable for painting. Any reading above that level, then the surface shall be neutralized as required for the surface to be painted.
 - a. Methods shall be consistent with MPI Architectural Painting Specification Manual, and shall not result in any adverse condition causing inadequate adhesion, improper curing and drying, or durability of paint system.
- 4. No exterior painting shall be done during winds or dusty conditions.
- 5. Perform no exterior painting and decorating work unless environmental conditions are within MPI and paint manufacturer's requirements or until adequate weather protection is provided.
 - a. Where required to meet project schedules, suitable weatherproof covering and sufficient heating facilities shall be in place to maintain minimum ambient air and substrate temperatures for 24 hours before, during and after paint application.
- 6. Perform no interior painting or decorating work unless adequate continuous ventilation and sufficient heating facilities are in place to maintain minimum ambient air and substrate temperatures above minimum requirements for 24 hours before, during and after paint application.
 - a. Where required to meet project schedules, provide supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.

B. Existing Conditions:

- 1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
- 2. Concrete and masonry surfaces shall be installed at least 28 days prior to painting and decorating work and shall be visually dry on both sides.
- 3. Conduct all moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple cover patch test.
- 4. Test concrete, masonry and plaster surfaces for alkalinity as required.
- 5. Contractor shall provide a minimum lighting level of 323 Lux (30 foot candles) on surfaces to be painted or decorated.

1.8 WARRANTY

A. Contractor's General Warranty:

- 1. In accordance with Specification Section WARRANTIES.
 - a. Original adherence of all materials and no evidence of any surface defect shall be maintained during warranty period.
 - b. Color at end of warranty period shall remain free from serious fading and any discernible variations shall be uniform.

B. Manufacturer's Warranty:

- 1. In accordance with manufacturer's written standard warranty:
- 2. Provide Paint Manufacturer's special ten (10) year Material Warranty co-endorsed by the installer for exterior paint application of cement plaster surfaces.
 - a. Warranty period: Ten (10) Years.
- 3. Provide Water-Repellent Manufacturer's special Weatherproofing Warranty co-endorsed by the installer for exterior sealer application of concrete or concrete block surfaces.
 - a. Warranty period: Ten (10) Years.

C. Installer's Warranty:

- 1. Paint Installer's Warranty:
 - a. Installer will certify that a Paint Manufacturer's Representative tested the substrate according to Paint Manufacturer's standard procedures and have submitted project information and test patch forms.
 - b. Installer shall certify that Paint Manufacturer's products were installed on the structure in accordance with manufacturer's specification requirements.
 - c. Installer further agrees that if installer fails to fulfill their obligation under this certification statement within 30 days notice of the complaint, Paint Manufacturer may proceed with the investigation and repairs and shall pay the entire material cost, providing it wasn't the installer's responsibility.
- 2. Water-Repellent Installer's Warranty:
 - a. Warranty period: Two (2) Years.
 - b. Installer will certify that a Water-Repellent Manufacturer's Representative tested the substrate according to Water-Repellent Manufacturer's standard procedures and have submitted project information and test patch forms.
 - c. Installer shall certify that Water-Repellent Manufacturer's products were installed on the structure in accordance with manufacturer's specification requirements.
 - d. Installer agrees:
 - 1) Investigate all complaints of leakage and/or water absorption on surfaces to which Water-Repellent Manufacturer's weatherproofing products were applied and provide a written report of the cause to Water-Repellent Manufacturer within thirty (30) days of the complaint.
 - 2) Re-apply Water-Repellent Manufacturer's weatherproofing products according to Water-Repellent Manufacturer's standard procedures at installer's cost for labor and material if the leakage and/or water absorption is due to improper surface preparation, application and/or improper use of material.
 - 3) Request authority from Water-Repellent Manufacturer to re-apply Water-Repellent Manufacturer's weatherproofing products at Water-Repellent Manufacturer's expense to areas, which were not rendered hydrophobic due to imperfect weatherproofing materials.

e. Installer further agrees that if installer fails to fulfill their obligation under this certification statement within 30 days notice of the complaint, Water-Repellant Manufacturer may proceed with the investigation and repairs and shall pay the entire cost, providing it wasn't the installer's responsibility.

1.9 MAINTENANCE

A. Extra Materials:

- 1. Quantity: 10 percent of quantity needed to paint Project, but not to exceed one gallon, of each type and color of finish coat used.
- 2. Identification: At project completion, provide an itemized list complete with manufacturer, paint type and color coding for all colors used, and locations within the Project for Owner's later use in maintenance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified paint coating product manufacturer, or approved equivalent:
 - a. PPG PAINTS.
 - Composed of the following companies: AMERITONE PAINT, DECRATREND, DEFT, DEVOE COATINGS, DEVOE PAINT, FLOOD WOOD CARE, FULLER O'BRIEN, GLIDDEN, and SINCLAIR PAINT.
 - b. Also specified: GEMINI and MONOPOLE.
 - c. Acceptable alternative manufacturers:
 - 1) DUNN EDWARDS, KELLY MOORE PAINTS, SHERWIN WILLIAMS, BENJAMIN MOORE and VISTA PAINT. Submittals by these manufacturers, subject to specification requirements, must be in accordance with Section SUBMITTAL PROCEDURES.
 - a) Paint material quality and systems shall be equal to numbers and systems listed in Paint Finish Schedule at the end of this section.
 - b) If submitted paint numbers differ from Darden Architects, Inc. Paint Equivalency List, additionally submit explanation of difference and certification letter from the installer attesting that the different product is equal to or better than specified; i.e. equivalent or better percentage of solids, system ODFT, and VOC compliant. Paint Equivalency List published by Darden Architects, Inc. is available only for this project at written request.
 - 2. Specified water-borne Alkyltrialkoxy Silane water repellent product manufacturer, or approved equivalent:
 - a. EVONIK DEGUSSA CORPORATION.
 - 3. Specified Graffiti coating manufacturer, or approved equivalent:
 - a. Sacrificial:
 - 1) VISUAL POLLUTION TECH, INC.
 - b. Non-sacrificial:

- 1) BASF HYDROZO.
- 2) EVONIK DEGUSSA CORPORATION.
- 3) THIS STUFF WORKS TSW
- 4. Specified Intumescent Paint Manufacturer, or approved equivalent:
 - a. ISOLATEK INTERNATIONAL
- 5. Specified High Gloss Epoxy Pool Paint and Primer Manufacturer, or approved equivalent:
 - a. RAMUC.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 1. Shop Primers or Coil-Coated Primers: It shall be assumed that all Shop Primed or Coil-Coated primed metals do not meet the requirements for primer material and mil thickness as defined herein. As such, all Shop Primed or Coil-Coated primed metals shall be field primed as indicated in the schedule.
- B. Material Quality: Provide manufacturer's best-quality coating material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
 - 1. All materials used shall be lead and mercury free and shall have low VOC content to meet the applicable CARB standards in the area where the Project is located.
 - 2. All paint materials shall have good flowing and brushing properties and shall dry or cure free of blemishes, sags, air entrapment, etc.
 - 3. All Water-Repellant Coatings shall comply with the following:
 - a. Provide Alkyltrialkoxy Silane combination with a ratio concentration and application procedure as recommended by the manufacturer with the ability to cover in one or more applications for a ten year warranty in accordance with the following substrates:
 - 1) Thin Brick.
 - 2) Concrete.
 - 3) Concrete Masonry Units
 - 4) Split-Faced Concrete Masonry Units.
 - b. Color: Clear.
 - c. Active Substance: Alkyltrialkoxy Silane.
 - d. Active Content: 100 percent.
 - e. Solvent: Water.
 - f. Flash Point (Concentrate): 93 degrees F.
 - g. Flash Point (Mixed): 200 degrees F.
 - h. Density: 7.77 lbs./gallon.
 - i. VOC (19:1): 50 g/liter (Maximum).
 - j. VOC (9:1): 100 g/liter (Maximum).
 - k. VOC (6:1): 200 g/liter (Maximum).
 - 4. All Bituminous Paint:
 - a. Shall comply with Cold-Applied Asphalt-Mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil thickness per coat.

2.3 MIXES

A. Mixing and Tinting:

- 1. Unless otherwise specified herein or pre-approved, all paint shall be ready-mixed and pre-tinted at the factory. Re-mix all paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and color and gloss uniformity.
- 2. Paste, powder or catalyzed paint mixes shall be mixed in strict accordance with manufacturer's written instructions.
- 3. Where thinner is used, addition shall not exceed paint manufacturer's written recommendations.
- 4. Do not use kerosene or any such organic solvents to thin water-based paints.
- 5. Thin paint for spraying in strict accordance with paint manufacturer's written instructions. If directions are not on the container, obtain instructions in writing from the manufacturer and provide one copy of instructions to the Project Inspector.

2.4 FINISHES

A. Finish Colors:

- 1. Unless otherwise specified herein, all painting work shall be in accordance with MPI Premium Grade finish requirements as a minimum.
- 2. Determined by Architect prior to or as work progresses.
 - a. Colors to be selected from paint manufacturer's full color systems, including standard, premium and custom colors.
- 3. When deep or 'Ultra colors' are selected, submit to Architect proposed revision to specified system product numbers, according to manufacturer's written recommendations.
 - a. When deep or ultra colors are selected for use on walls or special color treatments such as graphics or many color changes are desired, the areas and extent of use will be clarified upon request of the Contractor.
- 4. Gloss standards, in accordance with MPI standards, using the ASTM D 523 "Test for Specular Gloss", are as follows:

Gloss Level	Description	Units	Units
		at 60 degrees	at 85 degrees
G1	Matte or Flat Finish	0 to 5	10 max.
G2	Velvet Finish	0 to 10	10 to 35
G3	Eggshell Finish	10 to 25	10 to 35
G4	Low Sheen or Satin Finish	20 to 35	35 min.
G5	Semi-Gloss Finish	35 to 70	
G6	Gloss Finish	70 to 85	
G7	High-Gloss Finish	Greater than 85	

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affects the execution of work under this specification section.

- a. Thoroughly examine (and test as required, if necessary) all conditions and surfaces to be painted and report in writing to the Contractor and the Architect any conditions or surfaces that will adversely affect the work of this section.
- b. The Installer is responsible for verifying the compatibility of items primed by others and the finish coat or coats required by the Contract Documents. Should an incompatibility occur, the Installer (along with the manufacturer's technical representative) will recommend compatible alternatives for the Architect's approval.
- 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
- 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Protection before Application:

- 1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.
- 2. Removal of Hardware and Miscellaneous Items:
 - a. Coordinate the work with other trades so that they remove electrical outlet and switch plates, mechanical diffusers, escutcheons, registers, surface hardware, fittings, fastenings, and the like prior to starting work under this Section.
 - b. Store during painting work. Coordinate cleaning and reinstallation after painting work is finished.
 - c. Do not use solvent or cleaning agents detrimental to permanent finishes.
 - d. Remove doors before painting to paint bottom and top edges, and then re-hang.
- 3. Protect adjacent surfaces against damage from painting operations. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
 - a. Protective means include: Drop cloths, shields, masking templates, etc.
 - b. Exterior surfaces include: landscaping, walks, drives, adjacent building surfaces, glazing, aluminum surfaces, etc.
 - c. Interior surfaces include: rating and instruction labels on doors, frames, equipment, piping, etc.

B. Surface preparation:

1. General:

- a. In accordance with MPI Standards.
- b. Surfaces to be finished shall be clean, dry and free of dirt, passivators, oils, loose paint and any other contamination that would adversely affect adhesion, protective properties or appearance of the coating.
- c. All oil, grease, dirt or other foreign matter shall be removed by washing with a solution of cleaner and water, rinse and allow to dry.
- d. If efflorescence, alkali or glazed surfaces exist, neutralize with acid wash followed by thorough water rinsing.
 - 1) Protect all adjacent substrates or materials that could be affected by acid washing or water rinsing. Collect all washing & rinsing residue and dispose of away from structures.
- 2. Wood Substrates (New and Repaint Surfaces):
 - a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
 - b. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
 - c. Fill holes and other imperfections with putty or plastic wood to match natural finish before and after application of prime or seal coat.

- d. Provide necessary extra treatment over knots, pitch pockets, sappy portions and other defects to produce a proper base for painting.
- e. Sand down raised grain or rough surfaces.
- f. Clean surfaces free of dust, soil and other foreign material.
- 3. Gypsum Board Substrates (New and Repaint Surfaces):
 - a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
 - b. Clean surfaces of dirt, laitance, excess mortar and foreign matter.
 - c. Do all necessary minor sanding.
 - d. Fill minor cracks, scratches, holes and nail heads.
- 4. Plaster Substrates (New and Repaint Surfaces):
 - a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
 b. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
 - c. Clean surfaces of dirt, laitance, excess mortar and foreign matter.
 - d. Neatly patch, flush and smooth, minor cracks, holes, pits and other imperfections in plaster or concrete surfaces.
- 5. Concrete Substrates (New and Repaint Surfaces):
 - a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
 - b. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
 - c. Clean surfaces of dirt, laitance, excess mortar and foreign matter.
 - d. Neatly patch, flush and smooth, minor cracks, holes, pits and other imperfections in plaster or concrete surfaces.
- 6. Metal Substrates (New and Repaint Surfaces):
 - a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
 - b. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
 - c. Shop Primed or Factory Primed Surfaces:
 - Shop Primed or Factory Primed Surfaces are considered "un-primed" due to their mil thicknesses provided, and common incompatibility issues with specified coating system; and are suitable only for protection during transit (shipment and storage) until incorporated into the Project.
 - 2) Remove dust, oil and rust.
 - 3) Sand surface lightly.
 - 4) Touch up imperfections, scratches, surface damage, etc. with the appropriate primer.
 - 5) Field connection welds, soldered joints, burned and abraded portions shall be spot primed with the appropriate primer.
 - d. Coil-Coated Product Surfaces:
 - Coil-Coated Product Surfaces are considered "un-primed" due to their mil
 thicknesses provided, and the common incompatibility issues with specified
 coating system; and are suitable only for protection during shipment and
 storage until incorporated into the Project.
 - 2) Remove dust, oil and rust.
 - 3) Touch up imperfections, scratches, surface damage, etc. with the appropriate primer.
 - 4) Field connection welds, burned and abraded portions shall be spot primed with the appropriate primer.
 - 5) Field apply manufacturer's written recommended primer coat over entire surface compatible with substrate finish and finish coats indicated on the paint schedule.
 - e. Un-primed Surfaces:
 - 1) Remove dust, rust, mill scale, grease and foreign matter by sand blasting or wire brushing.
 - 2) Surfaces to be smooth and ready to receive coatings.
 - f. Non-Ferrous Metal, Galvanized, Aluminum, and Copper Surfaces:

- 1) Metal Etch and Solvent Clean per SSPC-SP 1 or clean with TSP or other appropriate cleaner followed by thorough water rinsing.
- 2) Brush Blast to standards of SSPC-SP 16, or if blasting is not feasible, sand thoroughly, wipe clean and apply a test patch for the coating specified.
- 3) Allow system to cure at least one week, then test adhesion per ASTM D 3359 "Standard Test Methods for Measuring Adhesion by Tape Test."
- 7. Concrete Block Surfaces (New and Repaint Surfaces):
 - a. Interior Surfaces: MPI Interior Surface Preparation, Chapter 3, Section 3.
 - b. Exterior Surfaces: MPI Exterior Surface Preparation, Chapter 2, Section 3.
 - c. Clean and free of all dirt, dust, rust, oil and free from all foreign matter.
 - d. Test for moisture content.
 - 1) Do not coat if moisture is present.
 - 2) Concrete Blocks to be thoroughly dry and cured prior to coating.
 - e. Do not coat Masonry wall if joints are not properly pointed, has excessive mortar drippings cracked units or shows signs of excessive efflorescence.
 - 1) Notify Architect promptly through General Contractor.
 - 2) Do not coat until unsatisfactory and unacceptable Concrete Block surfaces are corrected suitable for coating.
 - f. Do not apply opaque finishes to Concrete Block with airless sprayer unless "backrolled."

3.3 APPLICATION

A. Standards:

- 1. In accordance with MPI Painting Manual.
- 2. In accordance with manufacturer's specifications.

B. Method:

- 1. Apply by brush, roller or spray in accordance with MPI Painting Manual and the coating manufacturer's written recommendations except where specified otherwise in Schedule of Paint Finishes.
- 2. Painting of doors by rollers shall only be allowed only if the applicator uses a 1/4 inch nap or less roller.

C. Coatings:

- 1. All coatings shall be applied without reduction except as specifically required by label directions, or required to be reduced by this Specification. In such cases, reduction shall be the minimum permitted and shall not exceed VOC limits.
- 2. Apply each coat evenly and allow each coat to dry prior to applying succeeding coats. Each coat to have enough consistency to conceal work to which it is applied.
 - a. Follow manufacturer's recommendations for recoat windows when using high performance coatings, epoxys, and urethanes.
- 3. Cut into a true line and leave smooth and clean without overlapping. Coat doors and windows in open position.
- 4. Sand finishes on smooth surfaces to assure proper adhesion of subsequent coats.
- 5. Tint each undercoat a lighter shade to facilitate identification of each coat, if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- 6. Apply coating systems so as to obtain not less than the dry film mil thickness recommended by the manufacturer.
- 7. Sand metal work only as necessary to provide for the complete bonding of coats.
- 8. Project Inspector to inspect and approve each coat and operation before succeeding coats are applied.

- 9. Finish work to be free from runs, sags, defective application and improper workmanship.
- 10. Back prime all woodwork and casework coming in contact with plaster, masonry or concrete immediately upon delivery to project.
- 11. Post sign promptly following application of coatings.

3.4 FIELD QUALITY CONTROL

- A. All surfaces, preparation and paint applications shall be inspected by the Project Inspector:
 - 1. Painted exterior and interior surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent to the Painting Inspection by the Project Inspector:
 - a. Brush / Roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coatings.
 - b. Evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles.
 - c. Damage due to touching before paint is sufficiently dry or any other contributory cause.
 - d. Damage due to application on moist surfaces or caused by inadequate protection from the weather.
 - e. Damage and / or contamination of paint due to blown contaminants (dust, spray paint, etc.).
 - 2. Painted surfaces shall be considered unacceptable if any of the following are evident under natural lighting source for exterior surfaces and final lighting source (including daylight) for interior surfaces:
 - a. Visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 39 inches.
 - b. Visible defects are evident on horizontal surfaces when viewed at normal viewing angles from a distance of not less than 39 inches.
 - c. Visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.
 - d. When the final coat on any surface exhibits a lack of uniformity of color, sheen, texture, and hiding across full surface area.
 - 3. Painted surfaces rejected by the Project Inspector shall be made good at the expense of the Contractor. Small affected areas may be touched up; large affected areas or areas without sufficient dry film thickness of paint shall be repainted. Runs, sags of damaged paint shall be removed by scraper or by sanding prior to application of paint.

3.5 CLEANING

- A. Clean in accordance with Specification Section TEMPORARY FACILITIES AND CONTROLS and PROJECT CLOSEOUT.
 - 1. Remove all paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.
 - 2. Keep work area free from unnecessary accumulation of tools, equipment, surplus materials and debris.
 - 3. Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.
 - 4. Clean equipment and dispose of wash water / solvents as well as all other cleaning and protective materials (e.g., rags, drop cloths, masking papers, etc.), paints, thinners, paint removers / strippers in accordance with the safety requirements of authorities having jurisdiction in the place where the Project is located.
 - 5. Protect and safeguard work of other trades.

3.6 PROTECTION

- A. Protection from Weather:
 - 1. Protect newly installed work from moisture for a period of time as recommended by the manufacturer after application.
- B. Protection from Traffic:
 - 1. Erect barriers or screens and post signs to warn of or limit or direct traffic away or around work area as required.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.7 SCHEDULES

- A. Refer to Exterior and Interior Finish Schedules on Drawings for applicable finishes used. This is a guide only and paint sub-contractor is responsible to check all drawings and be responsible for all paint work required to cover the complete painting and finishing of the interior and exterior including specialty items.
- B. It is the intent of the specifications and drawings to cover the complete painting and finishing of the Project whether or not it is specifically called for in the Specifications, Schedule of Paint Finishes, or indicated on the Drawings. Surfaces not specified in Paint Finishes Schedule shall be in accordance with manufacturer's written recommendations.
 - a. The following schedule was compliant with CARB Air Quality Standards at press time.
 - 1) Inform the Architect of any changes caused by stricter Air Quality Standards as part of the submittal process.
 - 2) Provide products compliant with CARB Air Quality Standards and Local Air Quality Control District requirements at the time of installation.
- C. Exception: When the Project involves remodel work, the scope of work is limited to the remodel area and adjacent existing substrates to minimize visible color incompatibility.
- D. Provide coating system minimum ODFT specified.
 - 1. Provide ODFT per system specified.
 - a. Do not apply thicker coats than specified to achieve ODFT. Apply additional coats if necessary for unifrom color.
 - 2. "Ultra Color" Note: A fourth and/or fifth coat may be required to achieve uniform chromatic hue without ghosting from undercoat or substrate.
 - a. The Contractor shall consider all Metal Paint Finishes noted "Ultra-color" as requiring as many as five (5) total coats.

E. INTERIOR PAINT FINISHES:

b.

- 1. INTERIOR WOODWORK
 - a. W-1 Flat Latex Minimum ODFT 4.2 MILS.
 - 1) 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
 - 2) 2nd Coat Flat 0 VOC (SPH-0) 6-4110XI
 - 3) 3rd Coat Flat 0 VOC (SPH-0) 6-4110XI
 - W-2 Semi-Gloss Acrylic Non-Blocking Enamel Minimum ODFT 4.0 MILS.
 - 1) 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI

- 2) 2nd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI
- 3) 3rd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI
- c. W-3 Gloss Waterborne Acrylic Non-Blocking Enamel Minimum ODFT 9.4 MILS.
 - 1) 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
 - 2) 2nd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
 - 3) 3rd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
- d. W-4 Semi-Transparent Resin Stain Minimum ODFT 1.9 MILS.
 - 1) 1st Coat Resin Wiping Stain DEFT Int. Stain
 - 2) 2nd Coat Clear Acrylic DEFT Clear Wood
- e. W-5 Semi-Transparent Resin Stain Minimum ODFT 3.3 MILS.
 - 1) 1st Coat Resin Wiping Stain DEFT Int. Stain
 - 2) 2nd Coat Clear Acrylic DEFT Clear Wood
 - 3) 3rd Coat Clear Acrylic DEFT Clear Wood
- f. W-6 Stained and Water Clear Lacquer Minimum ODFT 3.8 MILS.
 - 1) 1st Coat Resin Wiping Stain DEFT Int. Stain
 - 2) 2nd Coat Lacq. Sanding Sealer DEFT WB Sanding Sealer
 - 3) 3rd Coat Clear Acrylic DEFT WB 109/S
 - 4) 4th Coat Clear Acrylic DEFT WB 109/S
- g. W-7 Filled and Sealed Floor Finish Minimum ODFT 3.0 MILS.
 - 1) 1st Coat Paste Filler As recommended by Flooring Manufacturer
 - 2) 2nd Coat Satin Polyurethane DEFT 26
 - 3) 3rd Coat Satin Polyurethane DEFT 26
- h. W-8 Velvet Lacquered Finish Minimum ODFT 4.7 MILS.
 - 1) 1st Coat Lacq. Sanding Sealer DEFT WB Sanding Sealer
 - 2) 2nd Coat Clear Acrylic DEFT WB 109/S
 - 3) 3rd Coat Clear Acrylic DEFT WB 109/S
 - 4) 4th Coat Clear Acrylic DEFT WB 109/S
- 2. INTERIOR GYPSUM BOARD
 - a. DW-1 Flat Latex Minimum ODFT 4.2 MILS.
 - 1) 1st Coat SPEEDHIDE ZERO (SPH-0) P/S 6-4900XI
 - 2) 2nd Coat Flat 0 VOC (SPH-0) 6-4110XI
 - 3) 3rd Coat Flat 0 VOC (SPH-0) 6-4110XI
 - b. DW-2 Eggshell Acrylic Non-Blocking Enamel Minimum ODFT 4.0 MILS.
 - 1) 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
 - 2) 2nd Coat Eggshell 0 VOC (SPH-0) 6-4310XI
 - 3) 3rd Coat Eggshell 0 VOC (SPH-0) 6-4310XI
 - c. DW-3 Gloss Acrylic Non-Blocking Enamel Minimum ODFT 9.4 MILS.
 - 1) 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
 - 2) 2nd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
 - 3) 3rd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
 - d. <u>DW-4 Gloss Epoxy Polyamide (Corrosion Resistant)</u> <u>Minimum ODFT 7.6</u> MILS.
 - 1) 1st Coat Acrylic Primer SEAL GRIP 17-921
 - 2) 2nd Coat Epoxy Gloss AQUAPON WB-EP 98E-1
 - 3) 3rd Coat Epoxy Gloss AQUAPON WB-EP 98E-1
 - e. <u>DW-4 WB Semi-Gloss Epoxy (Corrosion Resistant)</u> <u>Minimum ODFT 4.6</u> MILS.
 - 1) 1st Coat Acrylic Primer SEAL GRIP 17-921
 - 2) 2nd Coat Epoxy Semi-Gloss PITT-GLAZE 16-510
 - 3) 3rd Coat Epoxy Semi-Gloss PITT-GLAZE 16-510
 - f. DW-5 Semi-Gloss Acrylic Non-Blocking Enamel Minimum ODFT 4.0 MILS.
 - 1) 1st Coat SPEEDHIDE ZERO (SPH-0) Primer 6-4900XI
 - 2) 2nd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI
 - 3) 3rd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI

- 4) Note: This system was previous named "DW-2".
- 3. INTERIOR CEMENT PLASTER, VENEER PLASTER OR GYPSUM PLASTER
 - a. P-1 Flat Latex Minimum ODFT 4.8 MILS.
 - 1) 1st Coat Acrylic Primer-Sealer 3210
 - 2) 2nd Coat Flat 0 VOC (SPH-0) 6-4110XI
 - 3) 3rd Coat Flat 0 VOC (SPH-0) 6-4110XI
 - b. P-2 Semi-Gloss Acrylic Non-Blocking Enamel Minimum ODFT 4.6 MILS.
 - 1) 1st Coat Acrylic Primer-Sealer 3210
 - 2) 2nd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI
 - 3) 3rd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI
 - c. P-3 Gloss Acrylic Non-Blocking Enamel Minimum ODFT 10.0 MILS.
 - 1) 1st Coat Acrylic Primer-Sealer 3210
 - 2) 2nd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
 - 3) 3rd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
 - d. P-4 Gloss Epoxy Polyamide (Corrosion Resistant) Minimum ODFT 7.6 MILS.
 - 1) 1st Coat Acrylic Primer SEAL GRIP 17-921
 - 2) 2nd Coat Epoxy Gloss AQUAPON WB EP 98E-1 Series
 - 3) 3rd Coat Epoxy Gloss AQUAPON WB EP 98E-1 Series
 - e. P-4 WB S/G Epoxy (Corrosion Resistant) Minimum ODFT 4.6 MILS.
 - 1) 1st Coat Acrylic Primer SEAL GRIP 17-921
 - 2) 2nd Coat WB Epoxy Semi-Gloss PITT-GLAZE 16-510
 - 3) 3rd Coat WB Epoxy Semi-Gloss PITT-GLAZE 16-510
 - f. P-5 Semi-Gloss Acrylic Non-Blocking Enamel Minimum ODFT 4.6 MILS.
 - 1) 1st Coat Acrylic Primer-Sealer 3210
 - 2) 2nd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI
 - 3) 3rd Coat Semi-Gloss 0 VOC (SPH-0) 6-4510XI
- 4. INTERIOR CONCRETE OR CONCRETE MASONRY UNITS
 - a. CB-1 Clear Water Repellent Sealer
 - 1) One Coat Alkyltrialkoxy Silane
 - a) EVONIK DEGUSSA "Agua-Trete®CONCENTRATE."
 - 2) Follow manufacturer's recommended coverage rate and installation recommendations for type of substrate to be covered.
 - 3) Provide manufacturer's 10 year warranty for Concrete Masonry Units and Split Faced Concrete Masonry Units.
 - b. CB-2 Flat Latex Fine Texture Minimum ODFT 9.9 MILS.
 - 1) 1st Coat Acrylic Block Filler (SPH-0) 6 7
 - a) Omit at concrete surfaces.
 - 2) 2nd Coat Flat 0 VOC (SPH-0) 6-4110XI
 - 3) 3rd Coat Flat 0 VOC (SPH-0) 6-4110XI
 - c. CB-3 Semi-Gloss Acrylic Enamel:
 - 1) Concrete Masonry Units: Minimum ODFT 9.7 MILS.
 - a) 1st Coat Acrylic Block Filler (SPEEDHIDE INT/EXT BLOCK FILL)
 - b) 2nd Coat Flat 0 VOC (SPH-0) 6-4510XI
 - c) 3rd Coat Flat 0 VOC (SPH-0) 6-4510XI
 - 2) Concrete Surfaces: Minimum ODFT 4.6 MILS.
 - a) 1st Coat Acrylic Primer-Sealer 3210
 - b) 2nd Coat Flat 0 VOC (SPH-0) 6-4510XI
 - c) 3rd Coat Flat 0 VOC (SPH-0) 6-4510XI
 - d. CB-4 Color High-Gloss Polyamide Epoxy:
 - 1) Concrete Masonry Units: Minimum ODFT 15.6 MILS.
 - a) 1st Coat W/B Epoxy Block Fill SPEEDHIDE HI-FILL INT/EXT BLOCK FILL
 - b) 2nd Coat Acrylic Primer SEAL-GRIP 17-921

- c) 3rd Coat Epoxy Gloss AQUAPON WB EP 98E-1
- d) 4th Coat Epoxy Gloss AQUAPON WB EP 98E-1
- 2) Concrete Surfaces: Minimum ODFT 7.6 MILS.
 - a) 1st Coat Epoxy Primer SEAL-GRIP 17-921
 - b) 2nd Coat Epoxy Gloss AQUAPON WB EP 98E-1
 - c) 3rd Coat Epoxy Gloss AQUAPON WB EP 98E-1
- e. CB-4 Color WB Semi-Gloss Epoxy:
 - 1) Concrete Masonry Units: Minimum ODFT 15.6 MILS.
 - a) 1st Coat W/B Epoxy Block Fill SPEEDHIDE 6-15
 - b) 2nd Coat Epoxy Primer SEAL-GRIP 17-921
 - c) 3rd Coat Epoxy S/G PITT-GLAZE 16-510
 - d) 4th Coat Epoxy S/G PITT-GLAZE 16-510 DFT 3.0 mils.
 - 2) Concrete Surfaces: Minimum ODFT 7.6 MILS.
 - a) 1st Coat Epoxy Primer SEAL-GRIP 17-921
 - b) 2nd Coat Epoxy S/G PITT-GLAZE 16-510
 - c) 3rd Coat Epoxy S/G PITT-GLAZE 16-510
- f. CB-5 Clear High-Gloss Polyamide Epoxy Minimum ODFT 5.0 MILS.
 - 1) 1st Coat Epoxy Gloss MONOPOLE Permashield 200
 - 2) 2nd Coat Epoxy Gloss MONOPOLE Permashield 200
- 5. INTERIOR METALS
 - a. PRIMER NOTE: Metals that are shop primed shall be considered "un-primed" and shall be primed with appropriate primer and thicknesses listed below:
 - 1) Ferrous Metal:
 - a) PPG DEVFLEX 4020 "Red" Mult-Purp. Metal Primer DFT 3.0 mils.
 - 2) Non-Ferrous Metal, Galvanized Metal or Aluminum:
 - a) PPG DEVFLEX 4020 "White" Mult-Purp. Metal Primer DFT 3.0 mils.
 - b. COIL-COATED PRODUCTS NOTE: Metal products primed with coil-coated products are to be assumed to be "un-primed" products and shall be additionally coated (or primed again) as follows:
 - 1) Coil-Coated Products:
 - a) Field apply manufacturer's recommended primer coat and mil thickness over entire surface compatible with substrate finish and finish coats indicated on paint schedule.
 - c. M-1 Flat Latex Minimum ODFT 5.8 MILS.
 - 1) 1st Coat Primer See primer note above.
 - 2) 2nd Coat Flat 0 VOC (SPH-0) 6-4110XI
 - 3) 3rd Coat Flat 0 VOC (SPH-0) 6-4110XI
 - d. M-2 Semi-Gloss "Ultra Color" Industrial Acrylic Minimum ODFT 11.0 MILS.
 - 1) 1st Coat Primer See primer note above.
 - 2) 2nd Coat Acrylic Semi-Gloss DEVFLEX 4216
 - 3) 3rd Coat Acrylic Semi-Gloss DEVFLEX 4216
 - e. M-3 Gloss "Ultra Color" Waterborne Acrylic Minimum ODFT 11.0 MILS.
 - 1) 1st Coat Primer See primer note above.
 - 2) 2nd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
 - 3) 3rd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
 - f. M-4 Semi-Gloss Epoxy Polyamide Minimum ODFT 6.0 MILS.
 - 1) 1st Coat Primer See primer note above.
 - 2) 2nd Coat Epoxy Semi-Gloss PITT-GLAZE 16-510
 - 3) 3rd Coat Epoxy Semi-Gloss PITT-GLAZE 16-510
 - g. M-5 Gloss Epoxy Polyamide Minimum ODFT 4.6 MILS.
 - 1) 1st Coat Epoxy Primer SEAL-GRIP 17-921
 - 2) 2nd Coat Epoxy Gloss AQUAPON WB EP 98E-1 Series

- 3) 3rd Coat Epoxy Gloss AQUAPON WB EP 98E-1 Series
- h. M-5 Water Base S/G Epoxy (Corrosion Resistant) Minimum ODFT 7.6 MILS.
 - 1) 1st Coat Acrylic Primer SEAL GRIP 17-921
 - 2) 2nd Coat WB Epoxy S/G PITT-GLAZE 16-510
 - 3) 3rd Coat WB Epoxy S/G PITT-GLAZE 16-510
- i. M-6 Flat Waterborne Paint Minimum ODFT 4.4 MILS.
 - 1) 1st Coat Flat Dry Fall Prime SUPER TECH 6-726XI
 - 2) 2nd Coat Flat Dry Fall Finish SUPER TECH 6-726XI
- j. M-7 Semi-Gloss Waterborne Paint Minimum ODFT 4.4 MILS.
 - 1) 1st Coat S/G Dry Fall Primer SUPER TECH 6-724XI
 - 2) 2nd Coat S/G Dry Fall Finish SUPER TECH 6-724XI
- 6. INTERIOR ACOUSTICAL TILE
 - a. A-1 Matte Flat Vinyl Acrylic Minimum ODFT 1.3 MILS.
 - 1) 1st Coat Flat Vinyl Acrylic PRO-EV 0-VOC 12-110

F. EXTERIOR PAINT FINISHES

- 1. EXTERIOR WOOD
 - a. EW-1 Flat 100 percent Acrylic Minimum ODFT 6.0 MILS.
 - 1) 1st Coat Epoxy Primer SEAL-GRIP 17-921
 - 2) 2nd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
 - 3) 3rd Coat 100 percent Acrylic Flat 72-Series
 - b. EW-2 Semi-Gloss 100 percent Acrylic Minimum ODFT 5.6 MILS.
 - 1) 1st Coat Epoxy Primer SEAL-GRIP 17-921
 - 2) 2nd Coat 100 percent Acrylic Semi-Gloss SUNPROOF SEMI-GLOSS 78-Series
 - 3) 3rd Coat 100 percent Acrylic Semi-Gloss SUNPROOF SEMI-GLOSS 78-Series
 - c. EW-3 100 percent Acrylic Resin (A/R) Stain Minimum ODFT 3.0 MILS.
 - 1) 1st Coat 100 percent A/R Stain Coat FLOOD SWF
 - 2) 2nd Coat 100 percent A/R Stain Coat FLOOD SWF
- 2. EXTERIOR SOFFIT BOARD
 - a. ESB-1 Lo-Sheen 100 % Acrylic Resin (A/R)-Heavy Stipple Minimum ODFT 5.8 MILS.
 - 1) 1st Coat Epoxy Primer SEAL-GRIP 17-921
 - 2) 2nd Coat 100 percent Acrylic SUNPROOF SATIN 76-Series
 - 3) 3rd Coat 100 percent Acrylic SUNPROOF SATIN 76-Series
 - 4) *Note: 2nd Coat to have medium size aggregate added to achieve heavy stipple texture.
- 3. EXTERIOR CEMENT PLASTER
 - a. EP-1 Flat 100 percent Acrylic Minimum ODFT 7.0 MILS.
 - 1) 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
 - 2) 2nd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
 - 3) 3rd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
 - b. EP-2 Semi-Gloss 100 percent Acrylic Minimum ODFT 6.6 MILS.
 - 1) 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
 - 2) 2nd Coat 100 percent Acrylic Semi-Gloss SUNPROOF SEMI-GLOSS 78-Series
 - 3) 3rd Coat 100 percent Acrylic Semi-Gloss SUNPROOF SEMI-GLOSS 78-Series
 - c. EP-3 Gloss Styrene Acrylic Minimum ODFT 5.6 MILS.
 - 1) 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
 - 2) 2nd Coat Gloss ADVANTAGE 900 INT/EXT STYRENE ACRYLIC GLOSS

- 3) 3rd Coat Gloss ADVANTAGE 900 INT/EXT STYRENE ACRYLIC GLOSS
- d. <u>EP-4 Smooth Elastomeric, Lo Sheen Acrylic/Resin (A/R) Minimum ODFT 11.9</u> MILS.
 - 1) 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
 - 2) 2nd Coat Smooth Elastomeric PITT-FLEX 4-110
 - a) Spray and Backroll
 - 3) 3rd Coat 100 percent Acrylic Resin Semi Gloss 76-Series
- e. EP-5 Satin Elastomeric, S/G Acrylic/Resin (A/R) Minimum ODFT 11.8 MILS.
 - 1) 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
 - 2) 2nd Coat Matte Flex Elastomeric PITT-FLEX 4-110
 - a) Spray and Backroll
 - 3) 3rd Coat 100 percent Acrylic semi-gloss SUNPROOF SEMI-GLOSS 78-Series
- f. <u>EP-6 Coarse Elastomeric, Satin Acrylic/Resin (A/R)</u> <u>Minimum ODFT 11.8</u> MILS.
 - 1) 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
 - 2) 2nd Coat Elastomeric Finish 4-110
 - a) Spray and Backroll
 - 3) 3rd Coat 100 percent Acrylic Satin SUNPROOF SATIN 76-Series
- 4. EXTERIOR CONCRETE OR CONCRETE MASONRY UNITS:
 - a. <u>ECB-1 Clear Water Repellent Sealer:</u>
 - 1) One Coat Alkyltrialkoxy Silane:
 - a) EVONIK DEGUSSA "Aqua-Trete®CONCENTRATE."
 - 2) Provide manufacturer's 10 year warranty for Concrete Masonry Units and Split Faced Concrete Masonry Units.
 - b. ECB-2 Flat 100 percent Acrylic Minimum ODFT 11.5 MILS.
 - 1) 1st Coat W/B Acrylic Block Filler SPEEDHIDE 6-7
 - a) Omit at concrete surfaces
 - 2) 2nd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
 - 3) 3rd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
 - c. ECB-3 Flat 100 percent Acrylic Minimum ODFT 5.5 MILS.
 - 1) 1st Coat 100 percent Acrylic Primer-Sealer 4-603XI
 - 2) 2nd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
 - 3) 3rd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
- 5. EXTERIOR METAL
 - a. PRIMER NOTE: Metals shop primed shall be considered "un-primed" and shall be primed with appropriate primer and thicknesses listed below:
 - 1) Ferrous Metal, Type 1 Typical:
 - a) PITT TECH PLUS 4020 "Red" Multi-Purpose Metal Primer DFT 3.0 mils.
 - 2) Ferrous Metal, Type 2 as specified in Specification Section STEEL AND FABRICATIONS:
 - a) AMERCOAT 68HS Reinforced Inorganic Zinc-Rich Urethane Metal Primer DFT 5.0 mils.
 - 3) Ferrous Metal, Type 3 when Urethane is used as a finish:
 - a) AMERLOCK 2VOC/400 VOC Epoxy Metal Primer DFT 6.0 mils.
 - 4) Non-Ferrous Metal, Type 4 Galvanized Metal or Aluminum:
 - a) PITT TECH PLUS "White" Multi- Purpose Metal Primer DFT 3.0 mils.
 - 5) Non-Ferrous Metal, Type 5 Galvanized Metal or Aluminum, when Urethane is used as a finish.
 - a) AMERLOCK 2VOC/400 VOC Epoxy Metal Primer DFT 6.0 mils.

- b. COIL-COATED PRODUCTS NOTE: Metal products primed with coil-coated products are to be assumed to be unprimed products and shall be re-primed as follows:
 - 1) Coil-Coated Products:
 - a) Field apply manufacturer's recommended primer coat and mil thickness over entire surface compatible with substrate finish and finish coats indicated on paint schedule.
- c. EM-1 Flat 100 percent Acrylic Minimum ODFT 7.4 MILS.
 - 1) 1st Coat Primer See primer notes above.
 - 2) 2nd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
 - 3) 3rd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
- d. EM-2 Semi-Gloss "Ultra Color" 100 percent Acrylic Minimum ODFT 7.2 MILS.
 - 1) 1st Coat Primer See primer notes above.
 - 2) 2nd Coat 100 percent Acrylic Semi-Gloss SUNPROOF SEMI-GLOSS 78-Series
 - 3) 3rd Coat 100 percent Acrylic Semi-Gloss SUNPROOF SEMI-GLOSS 78-Series
- e. EM-3 Gloss "Ultra Color" 100 percent Acrylic Waterborne Minimum ODFT 11.0 MILS.
 - 1) 1st Coat Primer See primer notes above.
 - 2) 2nd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
 - 3) 3rd Coat Gloss Acrylic PITT-TECH PLUS 90-1310
- f. EM-4 Gloss "Ultra Color" Aliphatic Acrylic Urethane (A/A/U) Finish, Spray Applied, Deep Tone, Custom Color Minimum ODFT 16.0 MILS.
 - 1) 1st Coat Primer See primer notes above.
 - 2) 2nd Coat A/A/U Gloss Color AMERSHIELD VOC
 - 3) 3rd Coat A/A/U Gloss Color AMERSHIELD VOC
- g. <u>EM-5 Gloss "Ultra Color" Aliphatic High Solids Finish, Spray Applied, Deep</u> Tone, Custom Color with clear protective coats <u>Minimum ODFT 18.0 MILS.</u>
 - 1) 1st Coat Primer See primer notes above
 - 2) 2nd Coat A/A/U Gloss Color AMERSHIELD VOC
 - 3) 3rd Coat A/A/U Gloss Color AMERSHIELD VOC
 - 4) 4th Coat A/A/U Gloss Clear AMERSHIELD VOC
 - 5) 5th Coat A/A/U Gloss Clear AMERSHIELD VOC
- h. EM-6 Semi-Gloss "Ultra Color" Aliphatic Urethane (A/U) Finish, Spray Applied, Deep Tone, Custom Color Finish Minimum ODFT 20.0 MILS.
 - 1) 1st Coat Primer See primer notes above.
 - 2) 2nd Coat A/A/U Semi-Gloss AMERCOAT 240
 - 3) 3rd Coat A/A/U Semi-Gloss AMERSHIELD VOC

G. SPECIALTY PAINT FINISHES:

- 1. PROVIDE SPECIALTY PAINT FINISHES AS SHOWN OR AS FOLLOWS:
 - a. **Finish No. X-1:** Minimum ODFT 15.0 MILS.
 - Lines on Concrete or Asphaltic Concrete Paving Exit and Entrance Signs -10" width lines, maximum. Reflectorize as required.
 - 2) PPG ZoneLine
 - b. **Finish No. X-2:** Minimum ODFT 15.0 MILS.
 - 1) Lines on Walk Top. Colors as selected by Architect.
 - 2) PPG ZoneLine
 - c. Finish No. X-3: Minimum ODFT 2.2 MILS.
 - 1) Space above Vents or Grilles.
 - 2) 1st Coat 100 percent Acrylic Flat Black 72-Series
 - d. Finish No. X-4: Minimum ODFT 7.0 MILS.
 - 1) Piping Black Steel or Cast Iron.

- 2) 1st Coat Multi-Purpose Metal Primer:
 - a) PITT TECH PLUS 4020 "Red"
- 3) 2nd Coat Acrylic Gloss Finish 2406G

e. **Finish No. X-5:** Minimum ODFT 7.0 MILS.

- 1) Piping Galvanized.
- 2) 1st Coat General Purpose Metal Primer.
 - a) PITT TECH PLUS 4020 "White"
- 3) 2nd Coat Gloss Enamel Finish:
 - a) PITT TECH PLUS 90-1310

f. **Finish No. X-6:** Minimum ODFT 11.0 MILS.

- 1) Machinery and Equipment (Coil Coated Products):
- 2) 1st Coat General Purpose Metal Primer:
 - a) PITT TECH PLUS 4020 "White"
- 3) 2nd Coat Gloss Enamel PITT TECH PLUS 90-1310
- 4) 3rd Coat Gloss Enamel PITT TECH PLUS 90-1310

g. **Finish No. X-7:** Minimum ODFT 7.0 MILS.

- 1) Sheet Metal Ducts:
- 2) 1st Coat General Purpose Metal Primer:
 - a) PITT TECH PLUS 4020 "White"
- 3) 2nd Coat 100 percent Acrylic Flat:
 - a) PITT TECH PLUS 90-1310

h. **Finish No. X-8:** Minimum ODFT 7.0 MILS.

- 1) Fire Hydrants:
- 2) 1st Coat General Purpose Metal Primer
 - a) PITT TECH PLUS 4020 "White"
- 3) 2nd Coat 100 percent Acrylic Flat
 - a) PITT TECH PLUS 90-1310

i. Finish No. X-9: Minimum ODFT 7.4 MILS.

- 1) Following items listed will receive Finish No. X-9 (including, but not limited to), Louvers, Grilles, or Access Panels.
- 2) 1st Coat General Purpose Metal Primer:
 - a) PITT TECH PLUS 4020 "White"
- 3) 2nd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series
- 4) 3rd Coat 100 percent Acrylic Flat SUNPROOF FLAT 72-Series

j. **Finish No. X-10:** Minimum ODFT 1.9 MILS.

- 1) Striping under Acoustical Board Surrounding Structure:
- 2) 1st Coat 100 percent Acrylic Flat Black SUNPROOF FLAT 72-Series

k. Finish No. X-11: Minimum ODFT 2.2 MILS.

- 1) Acoustical Board and Exposed Striping and Structural:
- 1st Coat 100 percent Acrylic Flat Black SUNPROOF FLAT 72-Series

1. **Finish No. X-12:**

- 1) Minimum ODFT as recommended by graffiti coating manufacturer.
- 2) Graffiti Coating, non-toxic, liquid, sacrificial wax-based Coating:
- 3) 1st Coat Graffiti Coating:
 - a) Graffiti-Pruf by VISUAL POLUTION TECH, INC.
- 4) 2nd Coat Graffiti Coating:
 - a) Only if recommended by manufacturer for substrate material type.
 - b) Graffiti-Pruf by VISUAL POLUTION TECH, INC.

m. **Finish No. X-13** (NOT APPLICABLE).

- n. **Finish No. X-14** (NOT APPLICABLE).
- o. Finish No. X-15:
 - 1) Clear Graffiti Coating, non-toxic, liquid, multi-polymer, non-sacrificial, single component sealer by BASF, or approved equivalent: One Coat

- a) **NOTE #1:** Test a small area of the existing substrate in an out-of-the-way spot, as determined by the Architect, for compatibility. Inform the Architect if an incompatibility is found for further direction. If found to be compatible, proceed as follows:
- 2) 1st Coat Clear, flat matte coat TAGGUARD by BASF.
 - a) **NOTE #2:** Follow manufacturer's recommendations for proper installation over various substrates. Applicator must be certified by the manufacturer as an approved applicator for this product over various substrate materials. Protect at least 24 hours minimum the treated surface until manufacturer's recommended curing time has been achieved against graffiti.
- 3) REMOVAL COAT TAGGUARD Cleaner.
 - a) **NOTE #3:** Provide remover in small containers equal to 8-16 oz. containers of material for the Owner's use. Instruct the designated representative of the Owner as to proper application of the remover, and all procedures for removing graffiti.
- p. **Finish No. X-16:** Non-sacraficial, aqueous, silane chemistry, ready-to-use, zero VOC high performance anti-graffiti treatment for masonry, concrete and natural stone, dries clear and will not yellow.
 - 1) Follow manufacturer's printed recommendations prior to use.
 - 2) Do not apply to wet surfaces. If surface is wet, let dry for a minimum of 24 hours prior to application. Do not use if temperature is below 40 degrees F or above 100 degrees F.
 - 3) Protect non-porous surface substrates from overspray. Always do a test patch to confirm the treatment before using to deterimine if there is any problems prior to full coverage of the porous surfaces.
 - 4) Concrete shall be allowed to cure a minimum of 28 days. All pointing or re-pointing shall be completed and allowed to cure for at least 3 days prior to coverage. All patching materials, caulking, sealing materials and traffic paint shall be fully cured before application.
 - 5) 1st Coat Clear, flat matte coat PROTECTOSIL ANTIGRAFFITI.
 - a) 175 to 250 sq. ft. per gallon, diluted by 14 parts of water, using a 1" nap roller.
 - 6) 2nd Coat Clear, flat matte coat PROTECTOSIL ANTIGRAFFITI.
 - a) 175 to 250 sq. ft. per gallon, un-diluted, using a 1" nap roller.
 - 7) 3rd Coat Clear, flat matte coat PROTECTOSIL ANTIGRAFFITI.
 - a) 175 to 250 sq. ft. per gallon, un-diluted, using a 1" nap roller.
 - b) 3rd Coat shall always be figured in as part of the Base Bid. 3rd Coat may be deleted if it is determined by all concerned that the two coats were sufficient to protect the surfaces. If not needed, then figure on a credit back to the Owner.
 - 8) Most graffiti removal can be achieved with standard non-hazardous cleaners and low-pressure waterblasting. Contact manufacturer for stubborn markings for removal.
- q. Finish No. X-17: Non-sacraficial, 100 percent active silane treatment with oleophobic additive, clear penetrating breathable VOC Compliant (400 g/L) surface treatment for use on concrete, brick masonry, concrete masonry units and natural stone.
 - 1) For flat (horizontal) concrete walks.
 - a) Manufacturer's printed recommendations for rate of coverage, and type of application method to protect porous surfaces from graffiti and for ease of walk-way clean-up.
 - b) Follow manufacturer's printed recommendations prior to use.

- c) Do not apply to wet surfaces. If surface is wet, let dry for a minimu of 24 hours prior to application. Do not use if temperature is below 40 degrees F or above 100 degrees F.
- d) Protect non-porous surface substrates from overspray. Always do a test patch to confirm the treatment before using to deterimine if there is any problems prior to full coverage of the porous surfaces.
- e) Concrete surfaces shall be allowed to cure a minimum of 28 days. All pointing or re-pointing shall be completed and allowed to cure for at least 3 days prior to coverage. All patching materials, caulking, sealing materials and paint shall be fully cured before application.
- 2) 1st Coat Clear, flat matte coat PROTECTOSIL BHN PLUS.
- r. Finish No. X-18: Non-sacraficial, Graffiti Coating, non-toxic, liquid, semi-permanent, acrylic based Coating Minimum ODFT as recommended by graffiti coating manufacturer.
 - 1) For application on sealed surface, including but not limited to CMU scheduled to be sealed, verify compatibility with sealer manufacturer prior to application of Sealer.
 - a) Only if recommended by manufacturer for substrate material type.
 - b) For application on natural porous surface, thin first coat with 40 percent water. All other coats shall be full strength.
 - 2) 1st Coat Graffiti Coating TSW4.
 - 3) 2nd Coat Graffiti Coating TSW4.
 - 4) 3rd Coat Graffiti Coating TSW4.
 - 5) 4th Coat Graffiti Coating TSW4.
 - 6) Provide Manufacturer's recommended TSW2G Graffiti Removal Kit.
- s. **Finish No. X-19:** Intumescent Paint Minimum ODFT per fire rating required.
 - 1) Primer: Per manufacturer's Written Recommendations, ODFT as required.
 - 2) 1st Coat Water Based Polymer, ISOLATEK INTERNATIONAL "CAFCO Spray Film WB3."
 - 3) 2nd Coat As required if needed no greater than 62 mils per coat.
 - 4) 3rd Coat As required if needed no greater than 62 mils per coat.
 - 5) 4th Coat Premium Exterior Latex Semi-Gloss GL68XX in thickness as recommended by manufacturer, and in color as selected by the Architect.
- t. **Finish No. X-20:** Pool Paint High Gloss Epoxy Minimum ODFT Approximately 3.6 mils.
 - 1) Primer: RAMUC "Clean and Prep Solution" per manufacturer's Written Recommendations
 - 2) 1st Coat Pool Paint by RAMUC
 - 3) Finish Coat Pool Paint by RAMUC

END OF SECTION

INTENTIONALLY LEFT BLANK

MISCELLANEOUS SPECIALTIES

SECTION 100500 – MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provision for and installation of specialty and built-in items required for this Work as indicated on the Drawings.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 30 00 CAST-IN-PLACE CONCRETE
 - 4. 05 12 00 STEEL AND FABRICATIONS
 - 5. 06 10 00 ROUGH CARPENTRY
 - 6. 06 41 23 MODULAR CASEWORK
 - 7. 07 60 00 SHEET METAL
 - 8. 08 11 10 METAL DOORS AND FRAMES
 - 9. 08 70 00 HARDWARE
 - 10. 08 80 00 GLASS
 - 11. 09 24 00 CEMENT PLASTER
 - 12. 09 29 00 GYPSUM BOARD
 - 13. 09 50 00 ACOUSTICAL CEILINGS
 - 14. 09 65 10 RESILIENT BASE AND ACCESSORIES
 - 15. 09 72 00 WALL COVERINGS
 - 16. 09 91 00 PAINTING
 - 17. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 SYSTEM DESCRIPTION

A. Performance Requirements: It is the intention of this section and the drawings to form a guide for a complete and operable system of all products or systems listed within this specification section. Any items not specifically noted but necessary for a complete and operable product or system shall be provided under this section.

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Shop Drawings:
 - a. Submit Shop Drawings and catalog cuts to the architect showing all details of installation and assembly and all requirements for work by other trades.
 - 2. Product Data:
 - a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect.

MISCELLANEOUS SPECIALTIES

1.4 DELIVERY, STORAGE, AND HANDLING

A. Storage and protection:

1. Use all means necessary to protect all specialty items before, during and after installation and to protect the installed work and materials of all other trades.

B. Replacements:

1. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

1.5 PROJECT CONDITIONS

A. Existing Conditions:

- 1. Surface Conditions:
 - a. Coordination: Coordinate with all other trades as required to ensure proper and adequate provision in framing and wall finish for the installation of the selected specialties in the locations required.
- 2. Inspection:
 - a. Prior to Installation, inspect all specific locations and verify that all necessary provisions have been made.
 - b. In the event of discrepancy, immediately notify the Architect.
 - c. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

1.6 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

NOT APPLICABLE

MISCELLANEOUS SPECIALTIES

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all specialty items where indicated on the Drawings and in full accordance with all pertinent regulations and the manufacturer's written recommendations, anchoring all components firmly in place for long life under hard use, and in accordance with IR (Interpretation of Regulations, "Division of the State Architect• ") Manual.

3.2 ADJUSTING

A. Upon completion of the installation, and as a condition of its acceptance, visually inspect the entire work of this Section, adjust all components for proper alignment and use, and touch up all abrasions and scratches to make them completely invisible.

3.3 SCHEDULES

- A. All items shall be as scheduled or approved equivalent items as set forth in the Substitution Section of these specifications, and all provisions of Division 00 GENERAL CONDITIONS, and the sections of Division 01.
- B. Dimensional Letters:
 - 1. Submittals in accordance with Part 1 of this Specification Section, and:
 - a. Sample Dimensional Letter in each finish selected.
 - b. Sample mounting device and accessories.
 - c. Approval by the Architect is required prior to fabrication and installation of all other letters. Sample, upon approval of the Architect, may be incorporated into the work.
- C. Lock Box: Provide Rapid Entry System Recessed Lock Box as manufactured by KNOX CO. Model #3200-R, Heavy-Duty, Medium Capacity, holds 10 keys maximum, 4" W x 5" H x 3-1/4" D.
- D. TV/Monitor Mount Bracket:
 - 1. Fixed Wall Mount:
 - a. Manufacturer: CHIEF MANUFACTURING, INC.
 - b. Product: "Fusion Wall-Fixed Series," coordinate size to match Monitor.
 - c. Features:
 - 1) UL Listed, HCAI Approved.
 - 2) Monitor Types: Universal.
 - 3) Orientation: Landscape.
 - 4) Weight Capacity: Verfy model with Monitor.

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 101400 - IDENTIFYING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all Identifying Devices, Acrylic Signs and Decals, materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 30 00 CAST-IN-PLACE CONCRETE
 - 4. 06 10 00 ROUGH CARPENTRY
 - 5. 08 11 00 METAL DOORS AND FRAMES
 - 6. 08 80 00 GLASS
 - 7. 09 24 00 CEMENT PLASTER
 - 8. 09 29 00 GYPSUM BOARD
 - 9. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 DEFINITIONS

- A. Definitions pertaining to signage are as follows:
 - 1. Characters Shall mean all letters, numbers, symbols or pictograms.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements for Tactile Signage:
 - 1. Characters and Graphics:
 - a. Finish and Contrast: Characters and their background shall have a non-glare finish. Characters shall contrast with their background, either light characters on a dark background or dark characters on a light background CBC Section 11B-703.5.1, 11B-703.6.2, and 11B-703.7.1.
 - b. Character Type: Characters on signs shall be raised 1/32 inch (0.794 mm) minimum and letters and numbers shall be sans serif uppercase characters accompanied by contracted (Grade 2) Braille complying with CBC Section 11B-703.3 and Table 11B-703.3.1.
 - c. Character Size: Raised characters (letters and numbers) shall be a minimum of 5/8 inch (15.9 mm) and a maximum of 2 inches (51 mm) high.
 - d. Pictorial symbol signs (pictograms): Pictorial symbol signs (pictograms) shall be accompanied by the verbal description placed directly below the pictogram. the outside dimension of the pictogram field shall be a minimum of 6 inches (152 mm) in height.
 - e. Character Placement: Characters and Braille shall be in a horizontal format. Braille shall be placed a minimum of 3/8 inch (9.5 mm) and a maximum of 1/2 inch (12.7 mm) directly below the tactile characters; flush left or centered. When tactile text is multilined, all Braille shall be placed together below all lines of tactile text.

- f. Proportions: Raised characters on signs shall be selected from fonts where the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the uppercase letter "I." Stroke thickness of the uppercase "I" shall be 15 percent maximum of the height of the character.
 - 1) For Braille Text, capitalization shall conform to CBC Section 11B-703.3.1.

2. Braille:

- a. California Contracted Grade 2 Braille shall be used wherever Braille is required in other portions of these standards. Braille shall accompany all raised characters CBC Section 11B-703.3 and Table 11B-703.3.1.
 - 1) Dots shall be rounded or domed.
 - 2) Below measured as a minimum in inches and maximum in inches:
 - 3) Dot Base Diameter: 0.059 (1.5 mm) to 0.063 (1.6 mm).
 - 4) Distance between two dots in the same cell (measured center-to-center): 0.100 (2.5 mm).
 - 5) Distance between corresponding dots in adjacent cells (measured center-to-center): 0.300 (7.6 mm).
 - 6) Dot Height: 0.025 (0.6 mm) to 0.037 (0.9 mm).
 - 7) Distance between corresponding dots from one cell directly below:
 - a) 0.395 (10 mm) to 0.400 (10.2 mm).
- 3. Signs shall be installed on the wall adjacent to the latch side of the door.
 - a. Where there is no space on the latch side, including at double leaf doors, signs shall be placed on the nearest adjacent wall, preferably on the right.
 - b. Mounting height shall be as indicated in details on the drawings and in compliance with 11B-703.4.1 and 11B-703.4.2.
- 4. Inspection: Signage shall be field inspected after installation per CBC 11B-703.1.1.2.
- B. Performance Requirements: It is the intention of this specification section and the drawings to form a guide for a complete, operable system signage system that is compliant with State and Federal Accessibility Regulations. Any items not specifically noted but necessary for a complete, operable and accessible system shall be provided under this section.

1.4 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect within thirty days of receipt of the NOTICE TO PROCEED.
 - 1) Provide actual 2-inch x 2-inch sample colors and patterns available from the manufacturers for color selection.
 - 2. Shop Drawings.
 - a. Submit shop drawings showing fabrication and installation of the work of this section including plans, elevations, sections, details of components, and attachments to other units of work, including accessibility dimensions for mounting heights.
 - b. Submit drawings indicating Room numbers shown on the Contract Documents coordinated with Owner's Room Numbers.
 - 3. Samples.
 - a. Provide actual 2-inch x 2-inch sample of each sign type specified.
 - 4. Quality Assurance/Control Submittals:
 - a. Certificates:
 - 1) Submit four (4) copies of certificates.

- 2) Upon completion of the installation, submit a Certificate from the Contractor (on the Contractor's Letterhead) and co-endorsed by the manufacturer/supplier, sub-contractor/installer that the signage supplied for this project requiring braille complies with the California Contracted Grade 2 Braille and the CBC Section 11B-703.3.
 - a) Those attesting to the compliance certificate above shall also acknowledge that they are aware of the Submission Under Penalty Of Perjury per California Government Code Section 12650, et seq, pertaining to false claims, and further know and understand that submission of certification of a false claim may lead to fines, imprisonment and/or other severe legal consequences.
- b. Manufacturer's Instructions:
 - 1) Submit three (3) copies of manufacturer's instructions.
- 5. Closeout Submittals in accordance with the following:
 - Maintenance Data in accordance with Specification Section PROJECT CLOSEOUT.
 - Record Documents in accordance with Specification Section RECORD DOCUMENTS.
 - c. Warranty in accordance with Specification Section WARRANTIES and this section.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications:
 - a. Engage an experienced Installer who has been approved by the manufacturer.
 - 2. Manufacturer's/Supplier's Qualifications:
 - a. Firm's experienced in successfully producing/supplying products similar to those indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- B. Regulatory Requirements:
 - 1. In accordance with Specification Section Regulatory Requirements, and the following:
 - a. ADA Americans with Disabilities Act of 1990.
 - b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
 - c. CBC California Building Code California Contracted Grade 2 Braille when required.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 - 1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
- B. Acceptance at Site:
 - 1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
 - 2. Damaged products will not be accepted.

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

1.7 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Acrylic Signs:
 - a. SIGNS OF SUCCESS, INC.
 - 1) (805) 925-7545 or www.signsofsuccess.net.
 - 2. Decals:
 - a. SETON NAME PLATE COMPANY.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MATERIALS

- A. Acrylic Signs:
 - 1. Frameless, Profile Material bonded to Substrate Backup Material.
 - a. All signs shall be made of exterior acrylic materials regardless of location (exterior or interior) within the Project.
 - b. Profile Material:

- 1) GRAVO-TAC "Exterior," modified acrylic material, 1-ply, 1/32 inch, matte finish, integral color as selected by the Architect.
- c. Substrate Material:
 - 1) 1/4 inch clear cast acrylic backup sheet.
 - 2) Aluminum Frames and back-up plates:
 - a) Extruded aluminum angle.
 - b) Back-up plates shall be manufacturer's standard 1/8" thick aluminum Plates suitable for exterior use, and mechanical attachment to substrates.
 - c) Corner Style: Square.
 - d) Size: 1/2" deep x 1/16" thick walls.
 - e) Reveal: 3/32", black color.

B. Decals:

1. Provide outdoor grade permanent vinyl material with die cut graphics, characters and self-adhesive back for bonding to clean, smooth surfaces.

2.3 ACCESSORIES

A. Fasteners:

- 1. Concealed Attachment: Provide appropriate flathead countersunk stainless steel screws for the substrate backing in which the sign is to be applied.
- 2. Exposed Attachment provide appropriate tamper resistant, flathead countersunk stainless steel screws with grommet finish washers for the substrate backing in which the sign is to be applied.
- 3. Adhesive: "Silastic Adhesive."
- 4. Foam Tape: SCOTCH MOUNT FOAM TAPE.

2.4 FABRICATION

A. Shop Assembly:

- 1. Braille Compliance:
 - a. See Part 1 of this specification SYSTEM DESCRIPTION, and comply with the "Design Requirements for Tactile Signage" that requires California Contracted Grade 2 Braille.
- 2. Acrylic Signs:
 - a. Manufacturer's standard Profile Material, computer engineered, adhesive backed, raised graphics, complying with the latest CBC and ADA Accessibility Chapters and Sections, and ANSI A 117.1.
 - 1) Pictograms: All symbols shall match as closely as possible the published "International" symbols. Other interpretations will not be deemed acceptable. All symbols shall be approved prior to fabrication.
 - 2) Do not exceed the depth of profiling as recommended by the manufacturer for the thickness of the material to be profiled.

2.5 FINISHES

A. Acrylic Signs:

- 1. Finish: Non-glare, face and core as selected by the Architect from the manufacturer's full color line, including any custom colors complying with the requirements for contrasting colors of field to Symbols and Braille Text.
- 2. Allow for two-color application one color for the field, and one color for the characters.

B. Decals:

1. Integral non-glare finish from outdoor vinyl and die cut vinyl graphics, characters, in contrasting colors as selected by the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

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

3.2 PREPARATION

A. Coordination:

- 1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work specified under this specification section.
- 2. Contractor to provide internal wall blocking for all attached identifying devices.

B. Protection:

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

C. Surface preparation:

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

3.3 INSTALLATION

A. General:

- 1. In accordance with manufacturer's written instruction and recommendations unless specifically noted otherwise.
- 2. In accordance with approved Submittals.
- 3. In accordance with Regulatory Requirements.
- 4. Set plumb, level, and square.

B. Layout:

- 1. Lines of all signs shall be straight and true.
- 2. Set plumb, level, and square.
- 3. Temporary positioning with foam tape.

C. Acrylic Signs:

- 1. "Blind" screw the back-up plate with four (4) flathead countersunk screws (minimum) so as not to interfere with face plate. Tape attachment is not allowed.
- 2. Anchor face plate to back-up plate with Silastic Adhesive for permanent attachment.
 - a. Tape attachment is not allowed.
- 3. Seal all exposed edges at exterior conditions with compatible sealant, same color as sign substrate backup plate.

D. Mounting Conditions:

- 1. Metal Stud Framed Wall: Provide solid metal backing, attached to studs, adequate for fastening at all corners of sign.
- 2. Wood Stud Framed Wall: Provide solid wood backing, attached to studs, adequate for fastening at all corners of sign.
- 3. Concrete and Concrete Masonry: Provide drilled 1/4" diameter concrete or concrete masonry stainless steel anchors at all corner s of signs.
- 4. Glass: Provide "Silastic Adhesive" for permanent attachment of back-up plate. Provide blank plate of same material and size as the sign itself. Place on opposite side of glass and aligned with sign. Color as selected by the Architect.
- 5. Door: Fasten to door with tamper resistant flathead countersunk screws, minimum three (3) stainless steel screws with grommet finish washers per sign.

3.4 FIELD QUALITY CONTROL

A. Site Tests:

1. As required by Regulatory Requirements.

3.5 CLEANING

- A. Clean in accordance with Specification Sections TEMPORARY FACILITIES AND CONTROLS and PROJECT CLOSEOUT.
 - 1. Leave area level and free of any ruts or debris. Appearance of earth surface shall be equal to or better than adjacent undisturbed surfaces.
 - 2. Clean any soiled surfaces at the end of each day, minimum.
 - 3. Finish shall be clean and ready for the application of any additional finishes.
 - 4. In accordance with manufacturer's written instructions and recommendations.

3.6 PROTECTION

A. Protection from traffic:

1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

3.7 SCHEDULES

A. General:

- 1. All signs with text shall have California Contracted Grade 2 Braille unless otherwise noted.
- 2. Refer to Plumbing drawings for number and approximate location for "Gas Valve" signs. Signs shall be mounted +2" above Finished Floor.
- 3. Refer to drawings for various backing requirements.

- B. Sign Material:
 - 1. A = Acrylic
 - 2. D = Decal.
- C. Mounting Condition:
 - 1. 1 = Metal Stud Framed Wall.
 - 2. 2 = Wood Stud Framed Wall.
 - 3. 3 = Concrete or Concrete Masonry.
 - 4. 4 = Glass.
 - 5. 5 = Door Mounted.
- D. Mounting Location
 - 1. Strike side adjacent (S-1).
 - a. Strike side adjacent reverse swing (SR-1).
 - 2. Strike side away (S-2).
 - a. Strike side away reverse swing (SR-2).
 - 3. Strike side adjacent wall reverse swing (SR-3).
 - a. Strike side adjacent wall (S-3).
 - 4. Hinge side adjacent (H-1).
 - a. Hinge side adjacent reverse swing (HR-1)
 - 5. Hinge side away (H-2).
 - a. Hinge side away reverse swing (HR-2).
 - 6. Hinge side adjacent wall (H-3).
 - a. Hinge side adjacent wall reverse swing (HR-3).
 - 7. Door mounted (D-1).
 - a. Door mounted reverse swing (DR-1).
- E. Sign Types:
 - 1. Sign Type 1 Accessibility Entrance:
 - a. 7"H x 7" L nominal square shape.
 - 1) 6" high non-Tactile International Symbol of Accessibility required.
 - 2) No Text or Braille required.
 - 2. Sign Type 2 Toilet Room:
 - a. 3.5" H x 7" L nominal rectangular shape.
 - 1) 3/4" high Tactile Text.
 - a) "XXXXXX" and "RESTROOM".
 - 2) Braille required.
 - b. 12" diameter nominal circular shape ("FEMALE").
 - 1) No Text or Braille required.
 - c. Equilateral triangle shape edges 12" L with vertex upward ("MALE").
 - 1) No Text or Braille required.
 - d. Equilateral triangle shape, superimposed within 12" diameter nominal circular shape ("UNISEX").
 - 1) No Text or Braille required.
 - 3. Sign Type 3 Occupancy Load:
 - a. 7" h x 15" L nominal rectangular shape.
 - 1) 3/4" high non-Tactile Text required.
 - a) "THE NUMBER OF PEOPLE PERMITTED IN THIS ROOM SHALL NOT EXCEED "XXX" BY ORDER OF THE STATE FIRE MARSHAL"
 - 2) No Braille required.
 - b. 7" h x 15" L nominal rectangular shape.

- 1) 3/4" high non-Tactile Text required.
 - a) "THE NUMBER OF PEOPLE PERMITTED IN THIS ROOM SHALL NOT EXCEED "XXX" FOR DINING OR "XXX" FOR ASSEMBLY BY ORDER OF THE STATE FIRE MARSHAL"
- 2) No Braille required.
- 4. Sign Type 4 Assistive Listening:
 - a. 7"H x 15"L nominal square shape.
 - 1) 6" high tactile International Symbol of Access for Hearing Loss required.
 - 2) 5/8" high Tactile Text required.
 - 3) No Braille required.
- 5. Sign Type 5 Room Identification:
 - a. 7" H x 7" L nominal square shape.
 - 1) 2" high Tactile Text required.
 - 2) Braille required.
 - b. 3 1/2" H x 15" L nominal rectangular shape.
 - 1) 2" high Tactile Text required.
 - 2) Braille required.
 - c. 11" H x 15"L nominal rectangular shape.
 - 1) 2" high Tactile Text required.
 - 2) Braille required.
- 6. Sign Type 6 Tactile Identification:
 - a. 3-1/2"H x 7"L nominal rectangular shape.
 - 1) 3/4" high Tactile Text required.
 - 2) Braille required.
 - b. 3-1/2"H x 15"L nominal rectangular shape.
 - 1) 3/4" high Tactile Text required.
 - 2) Braille required.
 - c. 7"H x 7"L nominal square shape.
 - 1) 3/4" high Tactile Text required.
 - 2) Braille required.
 - d. 7"H x 15"L nominal rectangular shape.
 - 1) 3/4" high Tactile Text required.
 - 2) Braille required.
- 7. Sign Type 7 Non-Tactile Identification:
 - a. 3-1/2"H x 7"L nominal rectangular shape.
 - 1) 3/4" high Non-Tactile Text required.
 - 2) No Braille required.
 - b. 3-1/2"H x 15"L nominal rectangular shape.
 - 1) 3/4" high Non-Tactile Text required.
 - 2) No Braille required.
 - c. 7"H x 7"L nominal square shape.
 - 1) 3/4" high Non-Tactile Text required.
 - 2) No Braille required.
 - d. 7"H x 15"L nominal rectangular shape.
 - 1) 3/4" high Non-Tactile Text required.
 - 2) No Braille required.
- 8. Sign Type 8 Directional:
 - a. 3-1/2" H x 15" L nominal rectangular shape.
 - 1) Tactile Arrow symbol(s).
 - 2) 3/4" high Tactile Text.
 - 3) Braille required.
 - b. 7" H x 15" L nominal rectangular shape.
 - 1) Tactile Arrow symbol(s).

- 2) 3/4" high Tactile Text.
- 3) Braille required.
- c. 11" H x 15" L nominal rectangular shape.
 - 1) Tactile Arrow symbol(s).
 - 2) 3/4" high Tactile Text.
 - 3) Braille required.
- d. 15" H x 15" L nominal square shape.
 - 1) Tactile Arrow symbol(s).
 - 2) 3/4" high Tactile Text.
 - 3) Braille required.
- 9. Sign Type 9 Area of Refuge:
 - a. 11" H x 7" L nominal rectangular shape.
 - 1) 5/8" high Tactile Text required.
 - 2) Braille required.
 - 3) 6" high Non-Tactile International Symbol of Accessibility.
- 10. Sign Type 10 Stair Identification:
 - a. 13" H x 18" L nominal rectangular shape.
 - 1) 1-1/2" H x 1/4" stroke Tactile Text Stair Identification.
 - 5" High x 3/4" Stroke Tactile Text identifying Floor Level. Floor Level shall be preceded by "M" if Mezzanine Level or "B" if Basement Level.
 - 3) 1" High x 1/4" stroke Tactile Text identifying stairs upper terminus.
 - 4) 1" High x 1/4" stroke identifying stairs upper and lower terminus.
 - 5" High Tactile five pointed star left of floor level shall be provided at level of discharge.
 - b. 13" H x 18" L nominal rectangular shape.
 - 1) 1-1/2" H x 1/4" stroke Tactile Text Stair Identification.
 - 5" High x 3/4" Stroke Tactile Text identifying Floor Level. Floor Level shall be preceded by "M" if Mezzanine Level or "B" if Basement Level.
 - 3) 1" High x 1/4" stroke Tactile Text identifying stairs upper terminus.
 - 4) 1" High x 1/4" stroke identifying stairs upper and lower terminus.

END OF SECTION

SECTION 101453 – ROAD AND PARKING SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to completely install all walk, road and parking signage materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 30 00 CAST-IN-PLACE CONCRETE
 - 4. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - Product Data.
 - a. Submit manufacturer's full color range (including any standard, premium and custom colors) for selection by the Architect and Civil Engineer.
 - 2. Shop Drawings.
 - a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, the loading, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Closeout Submittals in accordance with Specification Sections in Division One.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
 - 2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- B. Regulatory Requirements:
 - 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. ADA Americans with Disabilities Act.
 - b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

c. CBC California Building Code, all accessible parking signage shall be as required by CBC 11B-502.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Packing, shipping, handling, and unloading:
 - 1. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.
- B. Acceptance at Site:
 - 1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
 - 2. Damaged products will not be accepted.
- C. Storage and protection:
 - 1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
 - a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.5 PROJECT CONDITIONS

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

1.6 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES:
 - a. Warranty Period One (1) Year.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Signage material:

- 1. Signs shall be permanent and reflectorized, constructed of porcelain coating on steel with beaded text or approved equivalent.
- 2. Sign materials shall be hot-dipped galvanized, embossed steel, with a heavy-duty baked enamel finish.
 - a. 16 gage steel for all signs larger than 24" x 24".
 - b. 18 gage steel for all signs smaller than 24" x 24".

B. Brackets:

- 1. Galvanized Pipe, attached with vandal resistant fasteners.
 - a. Provide Owner with tool that is compatible with vandal resistant fasteners so that maintenance can be performed on the signs.

C. Posts:

1. Pipe, galvanized, Schedule 40, in accordance with ASTM A 53 "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless," with compatible galvanized Dome Caps.

D. Concrete:

1. See Specification Section – CAST-IN-PLACE CONCRETE.

E. Other Materials:

1. Materials not specifically indicated but needed for proper installation shall be new and of first quality as selected by contractor subject to review by the Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

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

3.2 INSTALLATION

A. General:

- 1. In accordance with Regulatory Requirements.
- 2. Set plumb, level, and square.
 - a. Set post plumb and at proper height.
 - b. Place concrete and tamp to assure consolidation.
 - 1) Footings shall be 8" in diameter, 24 inches deep minimum, unless otherwise noted.
 - 2) Top of concrete shall be 3-1/2 inches below finished grade.
 - c. Install brackets so signs are plumb and level.
 - d. The accessible signage shall be centered at the interior end of the parking space at a minimum height of 80 inches from the bottom of the sign to the parking space finished grade, ground or sidewalk.

1) In lieu of posts, the accessible parking space signage may also be centered on the wall at the interior end of the parking space (if applicable) at a minimum of 60 inches from the parking space finished grade, ground or sidewalk. Verify with Architect before using this option.

3.3 SCHEDULE

- A. Parking Entrance Accessible Sign:
 - 1. A sign shall be posted in a conspicuous place at each entrance to off-street parking facilities.
 - a. The sign shall be not less than 17 inches x 22 inches in size with lettering not less than one inch in height, which clearly and conspicuously states the following:
 - 2. Sign Verbiage:

"Unauthorized vehicles parked in designated accessible spaces not displaying distinguishing placards or special license plates issued for persons with disabilities will be towed away at owner's expense. Towed vehicles may be reclaimed at

	**	or by	**	
telephoning		**		

"Owner of Project to provide information as a permanent part of the sign. Sign provider to verify information needed with owner prior to fabrication."

- B. Parking Stall Accessible Sign:
 - 1. Each parking space reserved for the disabled shall be identified by a permanently affixed reflectorized sign and a minimum fine of \$250.00.
 - a. Sign shall display the International Symbol of accessibility shall be white reflectorized symbol and border on blue background. See drawings for overall size.
 - b. Add van accessible sign to the parking space identified on the contract drawings. See drawings for overall size.
 - 1) Van accessible sign shall have 1" high white letters, 1/2" white border on blue background.
- C. Directional Accessible Sign:
 - 1. 12" x 18" with International Symbol of Accessibility, 1" high letters that say "PERSONS WITH DISABILITIES PARKING," and directional arrow.
 - a. Arrow shall be square tip style.
 - b. Symbols and lettering shall be white reflectorized characters on blue background.
- D. Stop Sign:
 - 1. Stop Sign in accordance with traffic standards in the area where the project is located:
 - 2. 18" x 18" eight sided sign, 6" high letters that say "STOP."
 - a. Lettering shall be white reflectorized characters on RED background.
- E. Bus Entrance Sign:
 - 1. A sign shall be posted in a conspicuous place at each side of the bus drop-off area.
 - a. The sign shall be not less than 17 inches x 22 inches in size with lettering not less than one inch in height, which clearly and conspicuously states the following:
 - 2. Sign Verbiage:
- "Unauthorized vehicles parked in the bus drop-off area will be towed away at owner's expense. Towed vehicles may be reclaimed at

*	or by	*
telephoning	*	."

"Owner of Project to provide information as a permanent part of the sign. Sign provider to verify information needed with owner prior to fabrication."

- F. Bus Entrance Only Sign:
 - 1. 12" x18", 1-1/2" high letters that say "BUS ENTRANCE ONLY."
 - 2. Lettering shall be red on white background.
- G. Do Not Enter Sign:
 - 1. 12" x 18", 2" high letters that say "DO NOT ENTER."
 - 2. Lettering shall be white reflectorized characters on red background.
- H. Gate Sign:
 - 1. 12" x 18", 1" high letters that say:
 - a. "OPERATED BY SECURITY PERSONNEL ONLY."
- I. No Parking Sign:
 - 1. 12" X 18", 1-1/2" high letters that say:
 - a. "NO PARKING, BUS PARKING ONLY."
 - 2. Lettering shall be red on white background.
- J. Fire Riser Room Route Sign:
 - 1. 12" x 18", 1-1/2" high letters that say "FIRE RISER ROOM ROUTE."
 - a. Lettering shall be white reflectorized characters on red background.

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 102813 – TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Furnish all material, labor, equipment and services necessary to furnish Toilet Accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 06 10 00 ROUGH CARPENTRY
 - 4. 08 80 00 GLASS
 - 5. 09 24 00 CEMENT PLASTER
 - 6. 09 29 00 GYPSUM BOARD
 - 7. 09 30 13 TILE
 - 8. 09 72 00 WALL COVERINGS
 - 9. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES:
 - 1. Product Data.
 - 2. Shop Drawings.
 - a. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location (including ADA Required dimensions for mounting locations), and size of each field connection.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:
 - a. ADA American's with Disabilities Act 1990.
 - b. ANSI American National Standards Institute Specifications ANSI A117.1 "Accessible and Usable Buildings and Facilities".
 - c. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located
 - d. CBC California Building Code (California State Building Standards Code Title 24) and the latest edition of DSA's California Access Compliance Advisory Reference Manual.

1.4 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

A. See Schedule in PART 3.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All Toilet Room Accessories shall be furnished and installed by the Contractor, in accordance with manufacturer's written recommendations, and in accordance with accessibility mounting height.
- B. Install in accordance with CBC and ADA Accessibility Chapters and Sections, and ANSI A 117.1.

3.2 SCHEDULES

- A. All devices listed herein shall be installed where shown, complete, and ready for use in full compliance with all applicable codes and standards. The manufacturers listed are acceptable as approved suppliers to the Owner. Substitution of manufacturers other than those listed, must be approved by the Owner.
 - 1. Paper Towel Dispenser:
 - a. Mechanical touch-free dispensing method. Tumbler lock.
 - 1) Acceptable Manufacturers:
 - a) BOBRICK B-2860.
 - 2. Soap Dispenser:
 - a. OWNER FURNISHED, CONTRACTOR INSTALLED.
 - 3. Seat Cover Dispenser:
 - a. Stainless Steel, surface mounted.
 - 1) Acceptable Manufacturers:
 - a) BOBRICK B-221 (Classic Series).
 - b) BRADLEY 5831.
 - c) ASI-0477-SM.
 - 4. Toilet Tissue Dispenser:

- a. Accessible Stalls: Surface mounted double jumbo-roll toilet paper dispenser. Heavy gage, rust proof, type 304 stainless steel with no moving parts. Accepts 9" diameter roll. Tissue supplying viewing slot. Tumbler lock.
 - 1) Acceptable manufacturers:
 - a) BOBRICK B-2890.
 - b) BRADLEY 5424.
 - c) ASI 0042
- 5. Sanitary Napkins-Tampon Dispenser:
- 6. Recess mounted, stainless steel, double coin 25 cents each.
 - a. Acceptable manufacturers:
 - 1) BOBRICK B-37063-25.
- 7. Sanitary Napkin Disposal:
 - a. Surface mounted stainless steel.
 - 1) Acceptable manufacturers:
 - a) BOBRICK B-270.
 - b) BRADLEY 4781-15.
 - c) ASI 0852.
- 8. Mop Holder (All janitor's rooms):
 - a. Stainless steel, 36" long 4 holders.
 - 1) Acceptable manufacturers:
 - a) BOBRICK B-223 x 36.
 - b) BRADLEY 9954.
 - c) ASI 8215-C.
- 9. Grab Bars:
 - a. 1-1/2" diameter, 18 gage seamless, stainless safety-grip finish, exposed mounting, vandal resistant screws, in configuration as required.
 - 1) Acceptable manufacturers:
 - a) BOBRICK B-6806-99.
 - b) BRADLEY 812-2.
 - c) ASI 3501-P.
- 10. Mirrors (Type 1):
 - a. One piece channel frame, galvanized steel back, wall mounted for accessibility as detailed on the drawings, 1/4" tempered glass, size as shown.
 - 1) Acceptable manufacturers:
 - a) BOBRICK B-165 Series.
 - b) BRADLEY 781.
 - c) ASI 0620.
- 11. Waste Receptacles:
 - a. OWNER PROVIDED, CONTRACTOR INSTALLED.

END OF SECTION

INTENTIONALLY LEFT BLANK

FIRE PROTECTION SPECIALTIES

SECTION 104400 – FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all material, labor, equipment and services necessary to furnish and install Fire Protection Specialties, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 05 12 00 STEEL AND FABRICATIONS
 - 4. 06 10 00 ROUGH CARPENTRY
 - 5. 09 24 00 CEMENT PLASTER
 - 6. 09 29 00 GYPSUM BOARD
 - 7. 09 72 00 WALL COVERINGS
 - 8. 09 91 00 PAINTING
 - 9. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 REFERENCES

A. Standards:

- 1. In accordance with the following standards:
 - a. NAAMM National Association of Architectural Metal Manufacturers

1.3 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES.
 - 1. Product Data, indicating Project, location in Project for each Model Number for Fire Extinguishers, Fire Blankets, Cabinets, Doors and Trim

1.4 QUALITY ASSURANCE

A. Qualifications:

- 1. Installer Qualifications:
 - a. Engage an experienced Installer who has successfully completed three 3 projects of similar scope and size to that indicated for this Project.
- 2. Manufacturer/Supplier Qualifications:
 - a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
- B. Regulatory Requirements:
 - 1. In accordance with Specification Section REGULATORY REQUIREMENTS, and the following:

FIRE PROTECTION SPECIALTIES

- a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
- b. NFPA National Fire Protection Association (NFPA 10).

1.5 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
 - 2. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of portable fire extinguishers that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Failure of hydrostatic test according to NFPA 10.
 - 2) Faulty operation of valves or release levers.
 - a) Warranty Period: Six (6) years from date of Substantial Completion.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified product manufacturer, or approved equivalent:
 - a. LARSEN'S MANUFACTURING CO.
 - 1) Special hardware when required "Larsen-Loc".
 - 2) WB-1 at Kitchens:
 - a) Bracket Model #1007.
 - b) Fire Extinguisher Model #WC-6L.
 - b. Acceptable alternative manufacturer:
 - 1) JL INDUSTRIES
 - 2. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.



FIRE PROTECTION SPECIALTIES

2.2 MANUFACTURED UNITS

- A. Bracket and Extinguisher Type:
 - Surface mounted bracket Type WB-1.
 - General:
 - 1) Provide Multi-Purpose Fire Extinguisher with a UL Rating of 3A-40B:C.
 - 2) Model No. 821 extinguisher bracket, constructed of heavy gage steel with a white baked enamel finish.
 - b. Kitchen Locations:
 - 1) Provide Fire Extinguisher Model No. WC-6L (Wet Chemical) with a UL Rating of 2A:K.
 - 2) Provide extinguisher bracket Model No. 1007, constructed of heavy gage steel with a white baked enamel finish.
 - c. Provide backing in wall for attachment of bracket(s).

2.3 FABRICATION

- A. 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. Prepare doors and frames to receive locks.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
 - 1. Fabricate door frames of one-piece construction, with edges flanged.
 - 2. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 FINISHES, GENERAL

- 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.

2.5 STEEL FINISHES

- A. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond using manufacturer's standard methods.
- B. Baked-Enamel Finish: Immediately after cleaning and pre-treating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

FIRE PROTECTION SPECIALTIES

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:

- 1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affect the execution of work under this specification section.
 - a. Examine walls and partitions for suitable framing depth and blocking where recessed and semi-recessed cabinets will be installed.
 - b. Examine walls and partitions for suitable blocking where surface applied brackets will be installed.
 - c. Examine fire extinguishers for proper charging and tagging.
 - 1) Remove and replace damaged, defective, or undercharged units.
- 2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
- 3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:

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

B. Protection:

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

C. Surface preparation:

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

3.3 INSTALLATION

A. General:

- 1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
- 2. In accordance with approved submittals.
- 3. In accordance with Regulatory Requirements.
 - a. Comply with all applicable ADA and CBC requirements in regards to accessible mounting heights.
- 4. Set plumb, level, and square.
- 5. Identification:
 - a. Apply decals, vinyl lettering, or other identification devices at locations indicated.

B. Layout:

FIRE PROTECTION SPECIALTIES

1. Lines shall be straight and true.

3.4 ADJUSTING

- A. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
 - 1. Replace cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.5 CLEANING

- A. Clean in accordance with Specification Section PROJECT CLOSEOUT.
 - 1. Clean any soiled surfaces immediately.
 - 2. In accordance with manufacturer's written instructions and recommendations.
 - a. Remove temporary protective coverings and strippable films, if any, as security fire-protection specialties are installed, unless otherwise indicated in manufacturer's written installation instructions.
 - b. Adjust cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
 - c. On completion of cabinet installation, clean interior and exterior surfaces as recommended in writing by manufacturer.
 - d. Touch up marred finishes, or replace cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended in writing or furnished by cabinet manufacturer.

3.6 PROTECTION

- A. Protection from traffic:
 - 1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 105113 METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Provide all materials, labor, equipment and services necessary to install Lockers, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded.
- B. Related Sections: The following Project Manual Sections contain requirements that relate to this section:
 - 1. ALL DIVISION 00 SPECIFICATION SECTIONS.
 - 2. ALL DIVISION 01 SPECIFICATION SECTIONS.
 - 3. 03 30 00 CAST-IN-PLACE CONCRETE
 - 4. 06 10 00 ROUGH CARPENTRY
 - 5. 09 24 00 CEMENT PLASTER
 - 6. 09 29 00 GYPSUM BOARD
 - 7. 09 30 13 TILE
 - 8. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.

1.2 SUBMITTALS

- A. Submit in accordance with Specification Section SUBMITTAL PROCEDURES.
 - 1. Product Data.
 - 2. Shop Drawings:
 - a. Including fastening and any base information.
 - 3. Samples:
 - a. Color samples on metal indicating two tone color options per locker location.
 - 4. Manufacturer and Supplier:
 - a. Provide the Owner a warranty upon delivery of all Lockers that parts and accessories will be made available to the Owner in the future at no additional surcharge or re-tooling charge.
 - 5. Substitutions:
 - a. See Specification Section SUBSTITUTION PROCEDURES for time frames of acceptance or rejection of Substitution Requests. Sample locker tier and specification deviations shall be submitted for review. The Owner intends to thoroughly test for durability and compliance with the Owner's standards for Metal Lockers. Samples will not be returned. Those substitutions that are approved will be listed (with any modifications to design) in an addendum issued prior to the Bid Date.

1.3 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Fabricator Qualifications:
 - a. Firm experienced in successfully production Metal Lockers to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.

- 2. Installer Qualifications:
 - Engage an experienced Installer who has successfully completed installation of Metal Lockers similar in material, design, and extent to that indicated for this Project.
- B. Regulatory Requirements:
 - 1. In accordance with Specification Section REGULATORY REQUIREMENTS.
 - a. ADA Americans with Disabilities Act of 1990.
 - b. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.

1.4 WARRANTY

- A. Contractor's General Warranty:
 - 1. In accordance with Specification Section WARRANTIES.
- B. Manufacturer's Warranty:
 - 1. In accordance with manufacturer's written standard warranty:
 - a. Warranty Period One (1) Year.
- C. Installer's Warranty:
 - 1. In accordance with the terms of the Specification Section WARRANTIES:
 - a. Warranty period One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
 - 1. Specified product manufacturer:
 - a. LIST INDUSTRIES, INC. "SUPERIOR"
 - 2. Acceptable alternative manufacturers:
 - a. DEBOURGH MANUFACTURING COMPANY.
 - All welded Products equivalent to those listed as approved by the Owner with equivalent gages or parts listed in parenthesis after the LIST INDUSTRIES, INC. part items. No listing after the LIST INDUSTRIES parts means that DEBOURGH will supply the parts listed.
- B. Products from other manufacturers not listed must submit in accordance with Specification Section SUBSTITUTION PROCEDURES.

2.2 MANUFACTURED UNITS

A. General Locker Design:

- 1. Material: All locker components to be made of prime grade cold rolled steel free from imperfections and capable of taking a heavy coat of high gloss baked enamel, unless otherwise indicated.
 - a. Doors: shall be fabricated from 14 gage outer door with 7/8" bend at top and bottom and 18 gage inner horizontal stiffener welded to outer door at the recessed latch assembly and inside face of the door, approximately six inches from the top and bottom of the door to allow for ventilation when called for, to form torque free double pan door.
 - b. Vertical Dividers: shall be solid 18 gage cold rolled steel framed by 16 gage hollow "T" roll formed sections designed to conceal all edges of divider with entire assembly mig welded on 9" centers. Dividers to have 16 gage channel bracing welded at bottom to form rigid frame for each locker unit.
 - 1) DEBOURGH dividers to be 1" x 1" x 1/8" angle with 16 gage solid internal panels.
 - c. Tops and Bottoms: shall be formed from solid 16 gage cold rolled steel. Bottoms to be made of electro-galvanized painted steel. Sloping hoods of 16 gage steel shall be secured in place at time of installation in addition to the 16 gage flat top which is already an integral part of each unit.
 - d. Backs: Backs shall be solid 18 gage solid cold rolled steel securely mig welded.
 - e. Sides: Sides (when not dividers) shall be solid 16 gage solid cold rolled steel securely mig welded.
 - f. Closure: for door by manufacturer's standard nylon friction bumper fastened into the edge of the door.
 - g. Recessed Locker Handle: to be 22 gage stainless steel in a trapezoid shape to receive Owner supplied heavy duty padlocks. Handle shall be equipped with a full width stainless steel pull for easy opening. Rear of pan to be totally enclosed by door liner. Accessible designated lockers shall be equipped with manufacturer's standard accessible pull latch for ease of access.
 - h. Latch Assembly: shall be a single point rigid non-moving positive latch by means of a heavy gage latch (minimum 11 gage) securely welded to a full length 12 gage continuous door strike welded to the vertical frame divider which will attach inside the recessed pocket for flush clean appearance. The latch shall be reinforced for rigidity using an angle gusset welded to both the locker side and the frame. Provide a pry resistant lug as an integral part of the 11 gage latch. Rubber bumpers shall be securely attached to the strike.
 - i. Hinges: shall be minimum 13 gage, 3-1/2" long tight pin, seven knuckle type, securely riveted to frame and welded to door all doors shall have a minimum of two fasteners, unless otherwise indicated.
 - 1) Three hinges provided on doors of 42" and over.
 - 2) Two hinges on doors less than 42".
 - 3) DEBOURGH hinges shall be a minimum 3" long five knuckle pin type welded to frame and door for "a" and "b" above only.
 - j. Interior Equipment: Single tier lockers 12" or wider are provided with one double prong ceiling hook and three single prong wall hooks. Double and triple tier provided with two single prong wall hooks. Single tier lockers shall have one hat shelf located 12" below top of the locker on 72" models. Double and triple tier lockers have no shelf.
 - 1) Shelves: shall be solid 16 gage with 1-1/8" x 3/8" bend at front edge.

- k. Number Plates: to be polished aluminum not less than 3/8" high with etched numbers on black background attached by means of pop rivets. Accessible designated lockers to have the letter "A" etched in front of the numbers.
- 1. Continuous sloping tops: of solid 16 gage cold rolled steel, pitched per manufacturer's standard to prevent stacking of materials on top. All edges to have 1/2 inch return as indicated on the drawings, and joints shall line up with locker groupings below.
- m. Boxed-end panels: of solid 16 gage cold rolled steel at all exposed "ends" of locker bays. This is to be in addition to the standard locker side panel. Panels to be attached with concealed fasteners. All ends to be one homogeneous piece for both bays with no seams in the middle.
- n. All corner and front filler panels: are to be solid 16 gage cold rolled steel. See drawings and verify with Contractor the locations necessary for these filler panels.

B. Student Gym:

- 1. Same as the General Locker Design except for the following:
 - a. Doors: Doors shall be provided with manufacturer's stamped "Security-Plus Vents" for ventilation. Accessible designated lockers shall be equipped with manufacturer's standard accessible pull latch for ease of access.
 - 1) "Secur-N-Vents" by DEBOURGH is an acceptable equivalent to the "Security-Plus Vents" by LIST as listed above.
 - b. Backs: Backs shall be 13 gage flattened expanded metal securely mig welded.
 - c. Recessed Locker Handle: to be 22 gage stainless steel in a trapezoid shape to receive Owner supplied heavy duty padlocks. Handle shall be equipped with a full width stainless steel pull for easy opening. Rear of pan to be totally enclosed by door liner for "LIST INDUSTRIES." Accessible designated lockers shall be equipped with manufacturer's standard accessible pull latch for ease of access.
 - d. Latch Assembly: shall be a single point rigid non-moving positive latch by means of a heavy gage latch (minimum 11 gage) securely welded to a full length 12 gage continuous door strike welded to the vertical frame divider which will attach inside the recessed pocket for flush clean appearance. The latch shall be reinforced for rigidity using an angle gusset welded to both the locker side and the frame. Provide a pry resistant lug as an integral part of the 11 gage latch. Rubber bumpers shall be securely attached to the strike.

C. Student Dress:

- 1. Same as the General Locker Design except for the following:
 - a. Doors: Doors shall be provided with manufacturer's stamped "Security-Plus Vents" for ventilation. Accessible designated lockers shall be equipped with manufacturer's standard accessible pull latch for ease of access.
 - 1) "Secur-N-Vents" by DEBOURGH is an acceptable equivalent to the "Security-Plus Vents" by LIST as listed above.
 - b. Backs: Backs shall be 13 gage flattened expanded metal securely mig welded.
 - c. Recessed Locker Handle: to be 22 gage stainless steel in a trapezoid shape to receive Owner supplied heavy duty padlocks. Handle shall be equipped with a full width stainless steel pull for easy opening. Rear of pan to be totally enclosed by door liner for "LIST INDUSTRIES." Accessible designated lockers shall be equipped with manufacturer's standard accessible pull latch for ease of access.

d. Latch Assembly: shall be a single point rigid non-moving positive latch by means of a heavy gage latch (minimum 11 gage) securely welded to a full length 12 gage continuous door strike welded to the vertical frame divider which will attach inside the recessed pocket for flush clean appearance. The latch shall be reinforced for rigidity using an angle gusset welded to both the locker side and the frame. Provide a pry resistant lug as an integral part of the 11 gage latch. Rubber bumpers shall be securely attached to the strike.

D. Coaches:

- 1. Same as the General Locker Design except for the following:
 - a. Doors: Doors shall be provided with manufacturer's stamped "Security-Plus Vents" for ventilation. Accessible designated lockers shall be equipped with manufacturer's standard accessible pull latch for ease of access.
 - 1) "Secur-N-Vents" by DEBOURGH is an acceptable equivalent to the "Security-Plus Vents" by LIST as listed above.
 - b. Vertical Dividers: shall be 3/4" 13 gage flattened expanded metal framed by 16 gage hollow "T" sections designed to conceal all sharp edges of divider with entire assembly being mig welded. Dividers to have channel bracing at the bottom forming a rigid frame for each locker unit.
 - 1) Vertical Dividers for the Intermediate School (due to venting options provided in floor slab) shall be solid 16 gage cold rolled steel framed by 16 gage hollow "T" roll formed sections designed to conceal all edges of divider with entire assembly mig welded on 9" centers. Dividers to have 16 gage channel bracing welded at bottom to form rigid frame for each locker unit.
 - c. Backs: Backs shall be solid 18 gage solid cold rolled steel securely mig welded.
 - 1) Backs for the Intermediate School (due to venting options provided in floor slab) shall be 13 gage flattened expanded metal securely mig welded.
 - d. Shelves-Bottoms: shall be solid 16 gage electro-galvanized for bottoms with 1-1/8" x 3/8" bend at front edge.
 - e. Recessed Locker Handle: to be 22 gage stainless steel in a trapezoid shape to receive Owner supplied heavy duty padlocks. Handle shall be equipped with a full width stainless steel pull for easy opening. Rear of pan to be totally enclosed by door liner for "LIST INDUSTRIES." Accessible designated lockers shall be equipped with manufacturer's standard accessible pull latch for ease of access.
 - f. Latch Assembly: shall be a single point rigid non-moving positive latch by means of a heavy gage latch (minimum 11 gage) securely welded to a full length 12 gage continuous door strike welded to the vertical frame divider which will attach inside the recessed pocket for flush clean appearance. The latch shall be reinforced for rigidity using an angle gusset welded to both the locker side and the frame. Provide a pry resistant lug as an integral part of the 11 gage latch. Rubber bumpers shall be securely attached to the strike.
 - g. Base: Provide manufacturer's standard solid 16 gage, 4" high, extended welded base frame (including back and intermediate supports) for locker installation.
 - 1) DEBOURGH base shall be 14 gage, 4" high, welded steel base enclosed on all four sides and securely welded to locker bottom.
 - 2) Exception: See drawings for details regarding existing concrete base and venting to the back for the Intermediate School no Base required.

E. Staff:

1. Same as the Coaches Lockers, with padlock options, 18 gage solid backs, 13 gage expanded metal vented sides and solid 16 gage metal base.

2.3 FINISHES

- A. Baked-on enamel finish (or approved equivalent), two tone color selected by Owner, to all surfaces exposed and concealed, except plates and non-ferrous metal.
 - 1. Powder Coat finishes as provide by DEBOURGH are an approved equivalent to the specified finishes listed above.

PART 3 - EXECUTION

3.1 FABRICATION

- A. Prior to fabrication, inspect the installed existing conditions which affect the installation of Metal Lockers. Verify all clear finish dimensions that may affect the installation of the Metal Lockers
 - 1. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
 - 2. Installation of Metal Lockers shall constitute acceptance of existing conditions.
- B. All lockers to be pre-assembled of all mig welded construction in multiple column units to meet job conditions as shown on the drawings. Assembly of locker bodies by means of bolts, screws, rivets or other fasteners is not permitted.
 - 1. Doors can be riveted to the frames, but must have the hinges welded to the door.
- C. Finishing: Prepare metal substrates per manufacturer's written requirements and apply baked-on enamel finish, color selected by Owner, to all surfaces exposed and concealed, except plates and non-ferrous metal.
 - 1. Color samples on metal to be utilized in the lockers will be provided from the manufacturer's full color range (including custom colors) for color selection by the Owner. Owner wants the two tone color option 1 color for the frame, body and trim, and the other color for the doors.

3.2 INSTALLATION

- A. In accordance with Regulatory Requirements.
- B. In accordance with approved Submittals.
- C. Under supervision of manufacturer or his authorized agent with factory trained mechanics.
 - 1. Units shall be set in place fully pre-assembled by mig welding and securely attached to the wall (or bolted together if back to back). Units shall also be anchored to the floor or base as shown on the drawings.
 - 2. Maximum fastener spacing shall be 48" o.c. Provide two fasteners minimum per ganged locker units at wall and floor/base locations.
 - a. Anchor welded locker groups to floor/base 6" in from each locker unit end.
 - b. Lockers shall be anchored to wall 6" from each locker unit end 6" below unit top and into locker floor/base.

06/02/2022

3.3 SCHEDULES

A. Locker Schedule:

	LOCATION	SIZE (INCHES)	
		WxDxH	NUMBER
			OF TIERS
Staff Lockers			
	Kitchen	12 x 12 x 72	1
Student Dress	Lockers		
Locker Rooms 15 x 16 x 54			1

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 11 40 00- FOODSERVICE EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section includes of furnishing all labor and material required to provide and deliver all food service equipment herein specified into the building, uncrate, assemble, set-in-place, level and completely install, exclusive of final utility connections.
- B. Furnish all material and labor required to completely provide, deliver, and install all Food Service Equipment as specified herein and as shown on the drawings. This work shall be in strict accordance with the plans and specifications with all dimensions verified in the field prior to any fabrication.
 - 1. Coordinate the Food Service Equipment work with the respective trades performing preparatory work for the installation of the Food Service Equipment.
 - 2. Comply with all Federal, State and Municipal regulations which bear on the execution of this project. Food service aisless shall be a minimum of 36" wide and tray slides shall be mounted at 34" maximum above the finished floor. Food service equipment required to be accessible shall conform to all reach requirements in CDC 1104B-5, 1104B-6 and figures 11B-16 and 11B-17.

C. Work Includes:

- 1. Materials shown on the Food Service Equipment Schedule.
- 2. Piping, valves, and plumbing accessories that is integral within the equipment.
- 3. Furnishing control devices such as solenoid valves that are not integral with the equipment, for installation by Mechanical division 15 and/or Electrical Division 16.
- 4. Wiring, wiring devices, controls and mechanical accessories that are integral in the equipment.
- 5. Ventilating ducts, flues, controls, and mechanical accessories that are integral in the equipment.
- 6. Anchors, fasteners, fillers, and sealants for mounting equipment securely in place.
- 7. Cooperation with all other contractors on the job including the furnishing of information in the form of drawings, wiring diagrams and other data.
- 8. Touch-up painting after the installation of the food service equipment.
- D. Related Sections include the following:

- 1. Division 15 Mechanical
- 2. Division 16 Electrical

1.3 QUALITY ASSURANCE

A. QUALIFICATIONS:

1. Installer: Regularly engaged in providing food service equipment from manufacturers of this type of equipment a minimum of 5 years with at least 5 installations of this size and type that are at least each 3 years old.

B. STANDARD OF MANUFACTURE

- 1. Food service equipment that is specified as "custom" having no manufacture name or model number shall be manufactured by a Food Service Equipment Fabricator with at least five (5) years' experience with engineering, design, and fabrication of food service equipment. The manufacture shall be subject to the review of the Architect and/or Consultant and shall be approved by the National Sanitation Foundation. All Fabricated equipment shall be constructed in strict compliance with the latest standards of the National Sanitation Foundation and shall bear the mark of the National Sanitation Foundation in full compliance with all applicable codes and ordinances.
- 2. All electrically heated or operated equipment shall bear the seal of approval of the Underwriters Laboratories and shall comply with the National Electrical Code and all local Codes and Ordinances.
- 3. All food service equipment that is specified as "buy-out" having a specific manufacture name and model number shall comply with the latest editions of the National Sanitation Foundation.
- 4. All Gas heated, or operated equipment shall be the seal of approval of the American Gas Association (AGA)
- 5. All Steam heated, or operated equipment shall conform to the standard of the American Society of Mechanical Engineers (ASME) and shall be ASME approved.
- 6. Food shields and Sneeze guards shall meet all the requirements of National Sanitation Foundation (NSF) Standard 2.

1.4 SUBMITTALS

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

B. SHOP DRAWINGS / EQUIPMENT BROCHURES

1. No ordering or fabrication of equipment shall take place until such time as the equipment brochures and shop drawings have been reviewed in writing by the Architect and/or Consultant. Receipt of this review shall not relieve the Contractor from the responsibility of verifying all quantities and related dimensions, maintaining the specified quality of equipment, and verifying conditions of the job site.

- 2. Equipment Brochures; within twenty (20) calendar days after award of the contract, six (6) brochures containing manufacturers specification sheets, dimensioned drawings and/or other pertinent data describing all items of standard manufacture shall be submitted for review by the Architect and/or Consultant. Sheets with the notation "Fabricated Item" and name of the fabricated item, as well as any required mechanical, plumbing or electrical requirements shall be inserted between the manufacturer's specification sheets describing the "buy-out" equipment; thus, giving a complete brochure with all times accounted for. These brochures shall have hard white covers with clear transparent overlays and locking rings. The name of the Contractor, Architect, Consultant, and project clearly identified in large readable type. Failure to provide brochures in the manner as described above will be cause for rejection of said brochures.
- 3. Rough-in and Equipment Location Drawings; within thirty (20) calendar days after award of the contract, six (6) sets of bond prints of complete rough-in and details for electrical and plumbing services with both vertical and horizontal dimensions, from column centerlines or exterior walls for location said connection points and rough-in locations shall be submitted for review by the Architect and/or Consultant. Equipment location plans shall be drawn to scale of not less than 1/4" = 1'-0" and include a schedule of equipment clearly identifying all items. Minimum drawings size shall be 24"x 36".
- 4. Shop Drawings; within thirty (30) calendar days after award of the contract, six (6) sets of bond prints of shop fabrication drawings shall be submitted for review by the Architect and/or Consultant. Plans shall be drawn to scale of not less than 1/2"=1'-0". Additional plan views, elevations, and sections at 3/4"=1'-0" shall be supplied of all counters and tables with complete dimensions. All shop practices regarding joints, gussets, bracing, tie-downs, supports, etc. shall be clearly defined as well as gauges and quality of metals and brands and model numbers of all miscellaneous fittings, plumbing and electrical trim. The drawings shall also show locations of blocking (supplied under another sections) for all wall and ceiling mounted Food Service Equipment. Minimum drawings size shall be 24"x36".

C. SAMPLES

1. Provide all samples if specification requested.

D. SUBSTITUTIONS:

- 1. Manufacturer's listed in this section are used as standards for quality. All Substitutions shall be approved by the Architect and/or Consultant prior to installation.
- 2. Refer to Division 1 General Requirements for procedures governing substitutions
- 3. Only one substitution for each item will be considered.
- 4. Installation of any qualified substituted equipment is the Food Service Equipment Contractor's responsibility. Including any mechanical, electrical, structural changes required for the installation of qualified substitution shall be without additional cost to the Owner.

1.5 DISCREPANCIES:

A. In the event of discrepancies within the Contract Documents, the Architect and/or Consultant shall be so notified in sufficient time prior to bid opening, ten (10) days to allow issuance of an addendum.

B. In the event that time does not permit notification or clarification of discrepancies prior to the bid opening, following shall apply: The drawings and drawing schedules shall govern in matters of quantity; the specifications in matter of quality. In the event of conflict within drawings involving quantities, or within the specifications involving quality, the greater quantity and high quality shall apply. Such discrepancies shall be noted and clarified in the contractors bid. No additional allowances will be made because of errors, ambiguities, or omissions which reasonable should have been discovered during the preparation of the bid.

1.6 RESPONSIBILITY:

- A. The work as specified in this division shall include assuring that all required submittals conform to the intent and meaning of the documents, conditions at the job site, and all local codes and ordinances.
- B. Visit the job site to field check actual wall dimensions and utility rough-ins. Be responsible for furnishing, fabricating, and installing the equipment in accordance with the available space and utility services as they exist on the job site.
- C. Check all door openings, passageways, elevators, etc., to verify that the equipment can be transported to its proper location within the building. If necessary, check the possibility with the General Contractor of holding wall erection, placement of doorjambs, window, etc. for the purpose of moving equipment to its proper location.
- D. Notify the Architect and/or Consultant of any discrepancies between the plans and specification prior to fabrication of any equipment, to actual condition on the job.
- E. If any special hoisting equipment and operators are required, include cost as part of the bid for this work.

1.7 DELIVERY AND STORAGE

- A. All equipment specified herein shall be delivered to the job site; received and handled by the Contractor or his authorized agent. The Owner shall in no way be expected to store or handle any such equipment.
- B. All equipment shall be delivered in such a manner as to protect it against dirt, water, chemical or mechanical injury.
- C. Throughout the progress of the work, the Contractor shall keep the working area free of debris of all types resulting from his work.
- D. All packing material shall be removed from the project location by the Contractor.

1.8 COORDINATION

A. Coordinate work with mechanical, electrical, plumbing, interiors, and other trades whose work is in conjunction with equipment specified herein.

1.9 MEASUREMENTS

A. Verify all dimensions shown on the drawings by taking field measurements at the job site prior to fabrication of equipment or ordering equipment. Proper fit and attachment of all parts is required and is

the sole responsibility of the Food Service Contractor. If necessary, all equipment shall be fabricated so that it may be handled through finished door openings.

1.10 GUARANTEE / WARRANTY

- A. All work shall be guaranteed by the Foodservice Equipment Contractor against all defects for a term of one (1) year from the date of notice of completion. This guarantee shall cover replacement of defective material at the Foodservice Equipment Contractor expense, including transportation and labor. This guarantee will not cover any cost for replacement of parts or work made necessary by carelessness or misuse of the equipment by others.
- B. The Food Service Equipment Contractor shall provide at his own expense the installation, start-up and service for one (1) year from the date of recording the notice of completion of the project; the replacement of all condensing units and other refrigeration devices supplied under this contract. In addition to this one (1) year free service, the condensing units shall have a five (5) year compressor warranty; said warranty commencing at the date of completion.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Metal for construction purposes, where entirely concealed, shall be steel of wrought iron sections galvanized by the hot-drip process after fabrication. Bolts, screws, rivets, and similar attachments to this galvanized work shall be galvanized or brass. Exposed screw and rivet work shall be finished to match adjacent surfaces, flush and buffed smooth. Finished work shall be free of tool or construction marks, dents, or other imperfections; and at the completion of the work, all metal shall be gone over with a portable machine and buffed and dressed to perfect surfaces.
- B. All materials shall be new and of first grade. All gauges specified herein shall be minimum and shall be minimum and shall be established after polishing. They shall refer to:
 - 1. U.S. Standard Gauge for sheets and plates.
 - 2. Stainless steel shall be manufactured by one of the following: Allegheny Ludlum Steel Corporation, American Rolling Mills, U.S. Steel Corporation.
- C. The Contractor will be required to furnish a certified copy of the mill analysis of materials to the Architect and/or Consultant.
- D. Stainless steel sheets shall conform to ASTM A240, Type 304 Condition A, 18-8 having a No. 4 finish. No.2B finish shall be acceptable on surfaces of equipment not exposed to view. All sheets shall be uniform throughout in color, finish and appearance.
- E. Stainless steel tubing and pipe shall be Type 304, 18-8, having a No. 4 finish, and shall conform to either ASTM A213 if seamless or ASTM A249 if welded.
- F. Galvanized steel shall be approved grade of copper-bearing steel sheets with a minimum copper content of 20%. All sheets to be commercial quality, stretcher leveled, bonderized and re-rolled to insure smooth surface. Galvanized steel shall not be allowed in the construction and fabrication of any "Fabricated Assembly" items.

- G. All millwork materials shall be free from defect impairing strength, durability, or appearance; straight and free from warpage; and the best grade for their particular function. All wood shall be well seasoned and kiln dried and shall have an average moisture content of 8%, a maximum of 10%, and a minimum of 5%.
- H. Plywood and other woodwork of treatable species, where required by code, shall be fire-retardant treated to result in a flame spread rating of 25 or less with no evidence of significant progressive combustion when tested for 30 minutes duration under ASTM E-84 and shall bear the testing laboratory mark on the surface to be concealed.
- I. Concealed softwood or hardwood lumber shall be of poplar, Douglas fir, basswood, red oak, birch, maple, beech or other stable wood and shall be select or better grade, unselected for color and grain, surfaced four sides, square-edged, and straight. Basswood may be used where fire-retardant treated materials are required.
- J. Face veneers shall be matched for color and grain to produce balance and continuity of character. Mineral streaks and other discolorations, wormholes, ruptured grain, loose texture, doze or shake will not be permitted. Face veneer leaves on each surface shall be full-length, book matched, center matched, and sequence matched. Surfaces shall be sequenced, and blueprint matched. Veneers not otherwise indicated shall be plain sliced. Backing veneers for concealed surfaces shall be of a species and thickness to balance the pull of the face veneers.
- K. Hardwood plywood for painted surfaces shall conform to U.S. Product Standard PS -51-71, Type I, and shall have sound birch, maple or other approved close grain hardwood faces suitable for paint finish.
- L. Plastic laminate surfaces shall be laminated with thermosetting decorative sheets in the color, pattern and style as selected by the Architect. Horizontal surfaces shall be laminated with sheets conforming to Federal Specifications L-P-508F, Style D, Type I (general purpose), Grade HP, Class I, 1/16" thick, satin finish with rough sanded backs. Vertical surfaces shall be laminated with sheets conforming to Federal Specification L-P-598F, Style D, Type II (vertical surface), Grade HP, Class I, conforming, satin finish, 1/32" thick or heavier. Balance sheets for backs in concealed locations shall be .020" thick laminate backing sheets conforming to Federal Specification L-P-00508E, Style ND, Type V (backing sheet), Grade HP.
- M. Adhesive for application of plastic laminate to wood surfaces of counter tops shall be phonetic, resorcinol or melamine adhesive conforming to Federal Specification MMM-A-181C and producing a waterproof bond. Adhesive for applying plastic laminate to vertical surfaces shall be either a waterproof type or a water-resistant type such as a modified urea formaldehyde resin liquid glue conforming to Federal Specification MMM-A-188C. Contact adhesive will not be acceptable.
- N. Plate glass shall be 1/2" thick safety glass with polished edges.
- O. Sealant shall be equal to that manufactured by General Electric. Silicone construction 1200 sealant; in either clear or approved color to match surrounding surfaces.
- P. Sound deadening material shall be equal to that manufactured by H.W. Mortell Co., Kankakee, Illinois, and shall be sprayed by use of a mechanical device to a thickness of not less than 1/8" thick.

2.2 FINISHES

- A. Paint and coatings shall be of an NSF approved type suitable for use in conjunction with food service equipment. Such paint or coating shall be durable, non-toxic, non-dusting, non-flaking and mildew resistant, shall comply with all governing regulations and shall be applied in accordance with the recommendations of the manufacturer.
- B. All exterior, galvanized parts, exposed members of framework where specified to be painted shall be cleaned, properly primed with rust inhibiting primer, degreased, and finished with two (2) coats of epoxybased grey hammertone paint, unless otherwise specified.
- C. Stainless steel, where exposed, shall be polished to a #4 commercial finish. Were unexposed, finish shall be #2B. The grain of polishing shall run in the same direction wherever possible. Where surfaces are disturbed by the fabricating process, such surfaces shall be refinished to match adjacent undisturbed surfaces.

2.3 SHOP FABRICATED EQUIPMENT CONSTRUCTION

- A. Leg stands for open base tables or dish tables shall be constructed of 1-5/8" dia. 16-gauge stainless steel tubing, with stringer and cross braces of the same material. Joints between legs and cross braces shall be welded and ground smooth. Flattened ends on tube stretchers are not permitted. Mechanical fittings are also not permitted.
 - 1. Stainless Steel Leg Sockets: Component Hardware Group, Inc. model A18-0206, or accepted equal; weld to underside of countertop framing or at bottom of enclosed cabinet unit and fastened with flush set screw locking device.
 - 2. Sanitary Type Stainless Adjustable Foot: Component Hardware Group, Inc. model A10-0851, or accepted equal
- B. Tabletops shall be 14-gauge stainless steel unless otherwise noted, with all shop seams and corners welded, ground smooth and polished. Tops of closed base fixtures shall be reinforced on the underside with a framework of 1-1/2" angles or 16-gauge stainless steel hat section; and on open pipe frames with a 4" channel at each pair of legs. The leg sockets shall be welded to this channel. The channel in turn stud welded to the top. Tops shall be reinforced so that there will be any noticeable deflection. Unless otherwise shown on the detail drawings, metal tops shall be turned down 2", and back at 15-degree angle, with 1-1/8" turn-under, except were adjacent to walls or other pieces of equipment. The wall side shall be turned up 10" and back 2" at a 45-degree angle. Ends of this splash are to be closed. Free corner of tops shall be spherical. All tops shall have 1/8" of sound-deadening material applied to the underside by use of spray equipment in an oven, smooth application for ease in cleaning.
- C. Enclosed bases or cabinet bodies shall be of the material and gauge hereinafter specified. They shall be enclosed on the ends and sides as required. The bases shall be reinforced at the top with a framework of 1-1/2" x 1-1/2" x 1/8" stainless steel angles fully welded to the base with the stainless-steel angles 36" on center (maximum), with all corners of said framework mitered and fully welded. All vertical joints of the bases shall be fully welded, ground and polished. All free corners of enclosed bases or cabinet bodies and all corners against walls and other fixtures shall be square. In the case of fixtures fitting against or between walls, the bodies shall be set in 1" from the wall line, but the tops shall be extended back to the wall line to permit adjustment to wall irregularities. A flush fitting vertical trim strip (extension of the vertical end mullion without vertical seam of the same material as the body shall be provided at each end of the body and shall extend 1" to the wall line). These fixtures shall be constructed to set on bases or legs as hereinafter specified and shall be set in mastic in a vermin-proof manner.

- D. Shelves, mullions, and aprons shall be fabricated flush with the cabinet body, welded, ground, and polished. Butt joints are not acceptable.
- E. Drawers, to be furnished with stainless steel flush pull, Component Hardware Group Inc., model number P63-1012 or equal installed into the 18-gauge double-pan drawer front panel.
 - 1. Stainless steel locks, Component Hardware Group, Inc., model number P30-4781 or equal for each drawer. All drawers are to be keyed alike.
 - Stainless Steel full extension slides, Component Hardware Group, Inc., model no S52-0024 or equal. Provide two (2) per drawer. Slides to be installed so drawer will roll closed when released.
 - 3. Stainless steel removable drawer pan, Component Hardware Group, Inc., model number, S81-1520 or equal one (1) per drawer set loosely in a channel frame so it can be easily lifted out for cleaning. This supporting frame shall be welded stainless steel channel.
 - 4. Drawer face panel to be constructed of 18-gauge stainless steel double pan construction. (Single metal thickness drawer faces are not expectable.)
- F. Hinged doors in base cabinets shall be of double pan construction, insulated and constructed of 18-gauge stainless steel. Doors shall have wire type pull Component Hardware Group Inc., model number P46-1010 or equal installed as shown in elevations. Door pulls to be NSF and ADA compliant.
- G. Interior shelves shall be solid, non-removable 16-gauge stainless steel, with ends and backs provided with a 1-1/2" high turn-up against the body of the fixture and welded to the same. Front edge is to be turned down 1-1/2" and under 1/2", at the bottom shelf, beyond the edge of the base to prevent sagging and vermin collection.
- H. Under shelves on open tables shall be constructed of 16-gauge stainless steel, flanged down 90 degrees ½". The corners shall be welded to the legs. Under shelves shall be 10" from the floor. Backs shall be turned up 2".
- I. Elevated shelves shall be constructed of 16 gauges stainless steel with edges turned down in a square edge, and back 1/8"; except where shelves are adjacent to walls or other fixtures, where they shall be turned up 2". Corners shall be spherical, mounted on 14-gauge stainless steel support brackets.
- J. Sinks and drain boards shall be constructed of 14-gauge stainless steel. The working edge of the sink shall be provided with 5/8" radius sanitary rolled edge in one piece with rounded corners. The drain boards shall be made as an integral part of the sink; all vertical and horizontal corners shall be rounded with 5/8" radius; and the working front edges shall be maintained at one level, taking up the pitch of the drain boards by dropping the sink to allow for same. Depth of sink bowl shall be determined from the top bowl. Sinks shall be provided with back and end splashes with top edge flanged back 2-1/4" at 45-degree angle and attached to the building wall with "zee" clips. Splash back of sinks and drain boards shall be grained in the same direction. Suitable openings shall be cut for hot and cold-water supplies and waste outlets. All surface plumbing trim as called for on the drawings and herein specified shall be provided. Bottom of each sink bowl with center drain connection shall be fitted with a 2" lever type action waste valve mounted into the sink and made watertight. Sink bowls and drain boards shall have 1/8" of sound-deadening material underneath, spray-applied.

- K. Rivets, bolts, and screws shall not be permitted in any exposed location.
- L. All welding shall be of the heliarc method with welding rod of the same composition as the parts welded. Welds shall be complete, strong, and ductile with excess metal ground off and joints finished smooth to match adjoining surfaces. Welds shall be free of mechanical imperfections and shall be continuously welded so that the fixture shall appear as one-piece construction. Butt welds made by spot solder and finished by grinding are not acceptable.
- M. All exposed joints shall be ground flush with adjoining material and finished to harmonize therein. Whenever material has been sunk or depressed by welding operation, such depressions shall be suitably hammered and peened flush with the adjoining surface and, if necessary, again ground to eliminate low spots. In all cases, the grain of rough grinding shall be removed by successive fine polishing operations.
- N. All exposed welded joints in stainless steel construction shall be suitably coated with an approved metallic-based paint.
- O. After galvanized steel members have been welded, all welds and areas where galvanizing has been damaged shall have a zinc dust coating applied.
- P. Seams shall be continuous welds flush and ground smooth.
 - 1. Field Joints: Flush welded, ground smooth and polished on the job, solder or rivets not allowed.
 - 2. Counter Tops: Field joints in stainless steel counter tops and drain boards butt welded with welds ground flush and smooth and polished to match original finish.
 - 3. Pass windows: Provide a complete all welded seamless counter from inside area to the outside ledge at each pass window location. Mechanical joints, butt joints or lap joints will not be accepted.

2.4 ELECTRICAL REQUIREMENTS

- A. Standard UL listed materials, devices and components shall be selected and installed in accordance with NEMA Standards and recommendations and as required for safe and efficient use and operation of the Food Service Equipment without objectionable noise, vibration, and sanitation problems.
- B. Motors up to and including ½ HP are to be wired for 120-volt, single phase. Fixtures totaling more than 1000 watts are to be wired for 208-volt, single phase. Fixtures having multiple number of heating elements, can be wired for three phase with the load balanced as equally as possible within the fixture.
- C. Heating elements having a connected load of up to and including 1000 watts are to be wired for 120-volt, single phase. Fixtures totaling more than 1000 watts are to be wired for 208-volt, single phase. Fixtures having multiple number of heating elements can be wired for three phase with the load balanced as equally as possible within the fixture.
- D. Equipment where applicable shall be furnished with three-wire cord and plug.

2.5 PLUMBING TRIM, SINKS

- A. All vegetable and pot washing sinks or other 14" deep sinks shall have Fisher Mfg. Co. Model 22209 series (2" drain size) quick opening drain. Fisher Mfg. Co. Model 60100 splash mounted faucet shall be mounted over each partition as shown on the drawings.
- B. All cook sinks, pantry sinks or other 10" or 12" deep sinks shall have Fisher Mfg. Co. Model 22209 series (2" drain size or as shown on the drawings) quick opening drain. Fisher Mfg Co. Model 57649 faucets mounted as shown on the drawings.
- C. All Fisher Mfg., Co. faucets to be furnished as stainless steel to comply with AD1953 Standards and conform to NSF 61 Standard 9.
- D. Provide gas pressure regulators for installation by the Plumbing Contractor.
- E. FIRE SUPPRESSION GAS SHUT/OFF VALVE: Gas valve to be furnished by the Foodservice Equipment Contractor and furnished to the Plumbing Contractor for installation. Foodservice Equipment Contractor is to verify with plumbing division for gas line size. Valve to be located in an accessible location and if necessary, with access panel.

2.6 HARDWARE

- A. Elevated shelf brackets shall be as shown on the Drawings.
- B. Drawer and door handles shall be as shown on the Drawings.
- C. Hinges for all metal doors shall be Klein Hardware Co. 7870 series, finished in satin chrome.

PART 3 INSTALLATION

3.1 POSITIONING OF EQUIPMENT

- A. Installation procedure, details and scheduling shall be so arranged that the work of other contractors may progress without unnecessary delay, interference, or damage.
- B. The Contractor shall do all fitting, joining, fastening, scribing, caulking, and adjusting necessary to install any fixed item of equipment in its designated location; and shall locate and/or store portable, non-fixed items as directed by the Architect and/or Consultant with due regard for the security and protection from damage of the items involved.

3.2 WORKMANSHIP

- A. Commencement of work shall constitute agreement with and acceptance of all conditions as found.
- B. Equipment shall be installed as shown on the plans. Where abutting, curved or irregularly shaped angles or projecting corners of walls occur, equipment shall be made to conform. Where several pieces of equipment are to be assembled in a group, the group shall be complete as whole, with all necessary filler or connecting pieces as may be required to make a complete, sanitary, and vermin-proof group.
- C. Welded parts shall be non-porous and free of imperfections. Welds on galvanized metal shall be ground smooth, sandblasted, and sprayed with molten zinc or 1200 degrees F to a thickness of .004". Tinning of

- welds will not be acceptable. Welds of stainless steel shall be ground and polished to the original finish and all grained in the same direction.
- D. All fixtures, unless made of stainless steel, shall be finished in sprayed lacquer in color as chosen by the architect; or if specifically stated, in "plastic laminate"; in pattern and/or color as selected by the Architect.

3.3 POST INSTALLATION PROCEDURES

- A. Prior to being offered for final acceptance, all equipment shall be thoroughly cleaned. This shall include removal of all stains, paint spots, protective wrapping and coatings, tapes, grease, oil, plaster, dust, polishing compounds, etc. and cleaning of floors in food service areas (broom clean) and signed off by the General Contractor with a copy to the Architect and/or Consultant.
- B. After installation at least ten (10) days prior to offering for acceptance, all equipment shall undergo a "Start-up" procedure by a Factory Authorized service dealer. Equipment is to be inspected, tested, calibrated, and adjusted for normal operation conditions. If inspection or testing indicated defects, such defects shall be corrected and the inspection and test repeated to insure a perfect operation of all equipment, prior to final acceptance and for a period ninety days after final acceptance.
- C. Upon completion of the project, the Contractor shall furnish the Owner two (2) sets of dimensional prints, data sheets, spare parts lists and operating manuals for each piece of mechanical equipment; each set shall be neatly bound in a loose-leaf binder, each set shall be complete with and index of equipment and with a complete list of service contracts with said agencies to perform these services. In addition to this list. The contractor shall submit for review of the Architect and/or Contractor and submittal to the Owner for his files, copies of service contracts with said agencies to perform these services. It shall be the responsibility of this contractor to fill out forward and all warranty forms as required.
- D. This contractor shall arrange demonstrations of the operation and maintenance of all buy-out" equipment by competent instructors. These demonstrations to take place within ten (10) days prior to the acceptance of the kitchen. All instruction periods shall be scheduled with the Architect and/or Consultant fourteen (14) days prior to commencement of same, and at times convenient to the Architect and/or consultant and Owner.

PART 4 ITIMIZED EQUIPMENT SCHEDULE

4.1 FOOD SERVICE EQUIPMENT LIST AND DESCRIPTION

- A. Fabricated Equipment: Wherever the term "Fabricated Assembly" is used within the list noted below and description of Food Service Equipment, it shall be presumed to be followed by the phrase, "constructed to the configuration, dimension, detail and design as shown on the drawings and specifications and with workmanship and materials as specified above" and shall meet the fabrication detail requirements of the latest edition of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA), and National Sanitation Foundation (NSF Standard 2).
- B. All food service equipment shall be installed per the "Guidelines for Seismic Restraints of Kitchen Equipment" by the Sheet Metal and Air Conditioning Contractors National Association (SMACNA).

- C. All food service equipment shall comply with the standards of The California Administration Code, Title 24, Part No. 2.
- D. All food service equipment shall comply with the current California Energy Commission Appliance Efficiency Regulations.
- E. Equipment in the following schedule is listed by Item Numbers shown on Drawings.
- F. OFCI- Owner Furnished Equipment / Contractor to install
 - OFOI- Owner Furnished Equipment / Owner to install
 - CFCI- Contractor Furnished Equipment / Contractor to install

4.2 SCHEDULED ITEMS:

ITEM #1 AIR CURTAIN

Quantity: One (1) Manufacturer: Berner Model: SLC07-1048A-BK

Stat: CFCI

Sanitation Series Low Profile Air Curtain, 48"L, unheated, (1) 1/5 hp motor, for doors up to 7' high, aluminized steel cabinet, baked-on electrostatic black powdered coated aluminum steel cabinet, interior or exterior mounting, UL, cULus, UL EPH, MADE IN USA

Accessories:

- 1 ea. Five-year parts warranty (unheated units)
- 1 ea. Model 9503SD020-P Automatic Door Switch, plunger type, activates air door when door opens, single phase only & max. amp draw of 20 amps, 120-240V
- 1 ea. Black powder coat exterior finish standard

ITEM #2 AIR CURTAIN

Quantity: Five (5)
Manufacturer: Berner
Model: SLC07-1036A-BK

Stat: CFCI

Sanitation Series Low Profile Air Curtain, 36"L, unheated, (1) 1/5 hp motor, for doors up to 7' high, aluminized steel cabinet, baked-on electrostatic black powdered coated aluminum steel cabinet, interior or exterior mounting, UL, cULus, UL EPH, MADE IN USA

Accessories:

- 5 ea. Five year parts warranty (unheated units)
- 5 ea. Model 9503SD020-P Automatic Door Switch, plunger type, activates air door when door opens, single phase only & max. amp draw of 20 amps, 120-240V
- 5 ea. Black powder coat exterior finish standard

ITEM #3.1 SHELVING UNIT, PLASTIC WITH POLY EXTERIOR STEEL POSTS

Quantity: Six (6) Manufacturer: Cambro Model: CPU244864VS4480

Stat: CFCI

Premium Starter Unit, 24"W x 48"L x 64"H, 4-tier, withstands temperature -36°F (-38°C) to 190°F (88°C), includes: (3) vented and (1) solid polypropylene shelf plates with CamguardTM antimicrobial protection, (2) preassembled post kits (posts constructed of steel with polypropylene exterior), (8) traverses & molded-in dovetails, 800 lbs. capacity per shelf /2,000 lbs. max capacity, speckled gray, NSF. Shelving to be 4-tier units with the bottom shelf at a minimum of 12" above finished floor. Provide post clamps to adjacent shelving unit two at front and two at back. Provide wall mounting angle brackets at top of shelving as shown.

Accessories:

24 ea. Model CSFF Camshelving® Accessory, 6-1/2" x 1-1/2" x 3-1/2", Seismic Foot, includes: (1) stainless steel floor bracket & (1) stainless steel leveling foot, to bolt a post to the floor, silver

24 ea. Model CSWF Wall Fastener, silver

ITEM #3.2 DUNNAGE RACK

Quantity: One (1) Manufacturer: Cambro Model: DRS480480

Stat: CFCI

S-Series Dunnage Rack, slotted top, 3000 lb. load capacity, 21"D x 48"W x 12"H, polypropylene, one-piece, seamless double wall construction, includes (1) Camlink®, 4" square legs, speckled gray, NSF

ITEM #3.3 SHELVING UNIT, PLASTIC WITH POLY EXTERIOR STEEL POSTS

Quantity: Three (3) Manufacturer: Cambro Model: CPU244264V5480

Stat: CFCI

Camshelving® Premium Starter Unit, 24"W x 42"L x 64"H, 5-tier, withstands temperature -36°F (-38°C) to 190°F (88°C), includes: (5) vented polypropylene shelf plates with CamguardTM antimicrobial protection, (2) preassembled post kits (posts constructed of steel with polypropylene exterior), (10) traverses & molded-in dovetails, 800 lbs. capacity per shelf /2,000 lbs. max capacity, speckled gray, NSF. Shelving to be 4-tier units with the bottom shelf at a minimum of 12" above finished floor. Provide post clamps to adjacent shelving unit two at front and two at back. Provide wall mounting angle brackets at top of shelving as shown.

Accessories:

12 ea. Model CSFF Camshelving® Accessory, 6-1/2" x 1-1/2" x 3-1/2", Seismic Foot, includes: (1) stainless steel floor bracket & (1) stainless steel leveling foot, to bolt a post to the floor, silver

12 ea. Model CSWF Wall Fastener, silver

ITEM #3.4 SHELVING UNIT, PLASTIC WITH POLY EXTERIOR STEEL POSTS

Quantity: Two (2) Manufacturer: Cambro Model: CPU246064VS4480

Stat: CFCI

Camshelving® Premium Starter Unit, 24"W x 60"L x 64"H, 4-tier, withstands temperature -36°F (-38°C) to 190°F (88°C), includes: (3) vented and (1) solid polypropylene shelf plates with Camguard™ antimicrobial protection, (2) pre-assembled post kits (posts constructed of steel with polypropylene exterior), (8) traverses & molded-in dovetails, 800 lbs. capacity per shelf /2,000 lbs. max capacity, speckled gray, NSF. Shelving to be 4-tier units with the bottom shelf at a minimum of 12" above finished floor. Provide post clamps to adjacent shelving unit two at front and two at back. Provide wall mounting angle brackets at top of shelving as shown.

Accessories:

- 8 ea. Model CSFF Camshelving® Accessory, 6-1/2" x 1-1/2" x 3-1/2", Seismic Foot, includes: (1) stainless steel floor bracket & (1) stainless steel leveling foot, to bolt a post to the floor, silver
- 8 ea. Model CSWF Wall Fastener, silver

ITEM #4 HAND SINK

Quantity: Two (2) Manufacturer: Eagle Group Model: HSAP-14-ADA-FW

Stat: CFCI

Hand Sink, wall mount, 14" wide x 16" front-to-back x 5" deep bowl, 16/304 stainless steel construction, splash mount gooseneck faucet with wrist handles & mixer valve, marine edge on front & sides, 1/2" NPS water inlet, chrome-plated P-trap, wrist handles, soap dispenser, basket drain, skirt assembly & paper towel dispenser, PHYSICALLY CHALLENGED, NSF

Accessories:

- Model 313305 T&S Extra Heavy Duty Gooseneck Faucet, wrist handles, splash mount 4" OC, NSF
- 2 ea. Model -LRS Left & right side splashes

ITEM #5 FOOD PACKAGING MACHINE

Quantity: One (1)

Manufacturer: Henkelman Inc Model: BOXER 52II COMBIVAC

Stat: CFCI

Vacuum Packaging Machine, countertop, 20-1/2"W x 16"D x 7"H chamber, (2) removable 16"W double wire seal bars (left and right), CombiVac sensor controls with (20) program presets & pump maintenance cycle, 889 cf/h (25 m³/h) capacity Busch vacuum pump, automatic transparent lid, USB port, includes filler plates, stainless steel construction, 1.34 HP, 110-120v/60/1-ph, 16.0 amps, NEMA 5-20P, 6ft. cord, ETL-Sanitation, cETLus, CE

Accessories:

- 1 ea. 1 year labor & 3 year parts warranty, standard
- 1 ea. (2) Seal bar left & right, standard
- 1 ea. Double seal, standard
- 1 ea. Model SERVICE KIT Service Kit, for standard maintenance
- 1 ea. Liquid control sensor with inclined insert plate

ITEM #6 SPARE

ITEM #7 WALL MOUNTED OVER SHELF

Quantity: One (1)

Manufacturer: Custom (or equal) Model: FABRICATED ITEM

Stat: CFCI

- A. To be 16-gauge stainless steel construction, 1 1/2" turn down in front and 2" turn up at back and right end and left ends. Provide 14-gauge stainless steel wall brackets as shown.
- B. Approximate Size: (1) ea.12" deep x length as shown.

ITEM #8 PREP SINK

Quantity: One (1)

Manufacturer: American Stainless-Steel Corp. (or equal)

Model: FABRICATED ITEM

Status: CFCI

Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

- A. Work area top to be 14-gauge stainless steel with a 14-gauge stainless steel backsplash at back 2" thick with a 45-degree top edge to wall, turn down ½" to "Z Clip" at back and right side. Top to be constructed with a "rolled" or marine edge as shown. Drainboards are to slope per NSF guidelines to sinks.
- B. Two (2) 14-gauge stainless steel formed and welded sinks, refer to drawings for bowl dimensional requirements. (Diecast sink bowls are not acceptable).
- C. Provide 16-gauge stainless steel undershelf with 1 ½" turn down at front and 2" turn up at back.
- D. Legs to be 16-gauge stainless steel tubular, stainless steel welded leg sockets, stainless steel adjustable feet, and stainless-steel cross rail bracing. Provide 16-gauge stainless steel undershelf as shown.
- E. Approximate size: 30" deep x length as shown.
- F. Twist waste valve to have support bracket installed as part of fabrication with a minimum of 4" clearance from twist handle.
- G. Provide adjustable seismic flanged feet. Refer to drawings for configuration and quantity.

Accessories:

- 2 ea. Fisher Model 22209 DrainKing Waste Valve, with flat strainer, 12 GPM drain rate, dual Teflon seals, stainless steel ball, cast red brass body
- 1 ea. Fisher Model 60917 Faucet, backsplash mount, 8" centers, 10" swing spout, lever handles with color-coded indexes, 1/2" NPT male inlets, with elbows, stainless steel, CSA, ADA Compliant
- 2 ea. Fisher Model 5000-2103 Close Elbow, 3/4" female, rough chrome

ITEM #9 PRE-RINSE FAUCET ASSEMBLY, WITH ADD ON FAUCET

Quantity: One (1) Manufacturer: Fisher

Model: 34452 Stat: CFCI Pre-Rinse Unit, spring style, backsplash mount, 8" centers, 16" riser, 36" hose, 1.15 GPM Ultra-Spray™ PLUS spray valve with built-in spray handle clip & dish guard bumper, lever handles with color coded indexes, add-on faucet with 10" swing spout, includes wall bracket, 1/2" NPT male inlets, brass, ADA Compliant

Accessories:

2 ea. Model 5000-2103 Close Elbow, 3/4" female, rough chrome

ITEM #10 WALL MOUNTED OVER SHELF

Quantity: One (1)

Manufacturer: Custom (or equal) Model: FABRICATED ITEM

Stat: CFCI

- A. To be 16-gauge stainless steel construction, 1 1/2" turn down in front and 2" turn up at back and right end and left ends. Provide 14-gauge stainless steel wall brackets as shown.
- B. Approximate Size: (1) ea.12" deep x length as shown.

ITEM #11 PLASTIC SHELVING UNIT

Quantity: Three (3) Manufacturer: Cambro Model: EMU244878V5580

Stat: CFCI

Camshelving® Elements Mobile Unit, 24"W x 48"L x 78-1/4"H, 5-tier, withstands temperature from -36°F (-38°C) to 190°F (88°C), includes: (5) vented reinforced polypropylene shelf plates with Camguard® antimicrobial protection, (4) composite posts, pre-assembled post connectors & wedges, (10) mobile traverses & (5) bags of 8 count dovetails (20 each A & B), (4) premium swivel casters with total locking brake, 750 lbs. max capacity, brushed graphite, NSF. Shelving to be 4-tier units with the bottom shelf at a minimum of 12" above finished floor. Provide post clamps to adjacent shelving unit two at front and two at back. Provide wall mounting angle brackets at top of shelving as shown.

Accessories:

- 3 ea. Lifetime warranty against corrosion and rust
- 3 ea. Model EMTR48580 Camshelving® Elements Traverse, for mobile units, 48"L, brushed granite, NSF
- 3 ea. Model EMTR482PK580 Camshelving® Elements Traverse, for mobile units, 48"L, includes (1) bag of 8 mobile traverse dovetails (4 each A & B), brushed graphite, NSF (2 per pack)

ITEM #12 PRE-RINSE FAUCET ASSEMBLY

Quantity: One (1) Manufacturer: Fisher

Model: 13390 Stat: CFCI

Pre-Rinse Unit, spring style, backsplash mount, 8" centers, 21" riser, 36" hose, 1.15 GPM Ultra-Spray™ PLUS spray valve with built-in spray handle clip & dish guard bumper, lever handles with color coded indexes, includes wall bracket, 1/2" NPT male inlets, brass, ADA Compliant

Accessories:

1 ea. Model 64211 Elbows, (2) 1/2", brass

© DARDEN ARCHITECTS, INC. 11 40 00 - 16 9/19/2022

ITEM #13 THREE COMPARTMENT POT WASH SINK

Quantity: One (1)

Manufacturer: American Stainless-Steel Corp. (or equal)

Model: FABRICATED ITEM

Status: CFCI

Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

- A. Work area top to be 14-gauge stainless steel with a 14-gauge stainless steel backsplash at back 2" thick with a 45-degree top edge to wall, turn down ½" at back and right side to Z-clips. Top to be constructed with a rolled edge as shown. Drainboards are to slope per NSF guidelines to sinks.
- B. Three (3) 14-gauge stainless steel formed and welded integral sinks, refer to drawings for bowl dimensional requirements. (Diecast sink bows are not acceptable).
- C. Provide and install 16-gauge stainless steel tubular legs, stainless steel welded leg sockets, and stainless-steel cross rail bracing.
- D. Provide 16-gauge stainless steel undershelf with 1 ½" turn down at front and 2" turn up at back.
- E. Provide adjustable seismic flanged feet. Refer to drawings for configuration and quantity.
- F. Twist waste valve to have support bracket installed as part of fabrication with a minimum of 4" clearance from twist handle.

Accessories:

- 3 ea. Fisher Model 22209 DrainKing Waste Valve, with flat strainer, 12 GPM drain rate, dual Teflon seals, stainless steel ball, cast red brass body
- 2 ea. Fisher Model 60100 Faucet, 3/4", 8" backsplash, with 10" swing spout & elbows, stainless steel
- 4 ea. Fisher Model 5000-2103 Close Elbow, 3/4" female, rough chrome

ITEM #14 CLEAN DISH TABLE

Quantity: One (1)

Manufacturer: American Stainless-Steel Corp. (or equal)

Model: FABRICATED ITEM

Status: CFCI

Fabricated assembly in length and configuration as shown on the drawings and shall include the following: To be fabricated of 14-gauge stainless steel.

- A. Work area top to be 14-gauge stainless steel with a 14-gauge stainless steel backsplash 2" thick with a 45-degree top edge to wall, turn down ½" at back and right side to Z-Clips. Top to be constructed with a "rolled" edge as shown. Drainboards are to slope per NSF guidelines to sinks.
- B. Provide adjustable seismic flanged feet. Refer to drawings for configuration and quantity.
- C. Provide and install 16-gauge stainless steel tubular legs, stainless steel welded leg sockets, stainless steel adjustable feet and 16 gauge welded tubular stainless undershelf.
- D. Approximate size: 30" deep x as shown. This item to be a part of item 13 Three Compartment Sink

ITEM #14.1 SOILED DISH TABLE

Quantity: One (1)

Manufacturer: American Stainless-Steel Corp. (or equal)

Model: FABRICATED ITEM

Status: CFCI

Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

© DARDEN ARCHITECTS, INC. 11 40 00 - 17 9/19/2022

- A. Work area top to be 14-gauge stainless steel with a 14-gauge stainless steel backsplash 2" thick with a 45-degree top edge to wall, turn down ½" at back and right side to Z-Clips. Top to be constructed with a "rolled" edge as shown. Drain boards are to slope per NSF guidelines to dishwasher Item #14.2.
- B. Provide and install 16-gauge stainless steel tubular legs, stainless steel welded leg sockets, stainless steel adjustable feet and 16-gauge welded tubular stainless undershelf.
- C. Provide adjustable seismic flanged feet. Refer to drawings for configuration and quantity.
- D. Approximate size: 30" deep x as shown. This item to be a part of item 13 Three Compartment Sink

ITEM #14.2 DISHWASHER, DOOR TYPE, VENTLESS

Quantity: One (1)

Manufacturer: Champion Model: DH-6000T-VHR

Status: CFCI

Genesis Dishwasher, door type, extended hood (27" opening for trays), ventless heat recovery, high temperature sanitizing with built-in stainless steel electric booster for (40°-70° rise), (40) racks/hour capacity, auto start, single point electrical connection, door interlock switch, on-board service diagnostics, Rinse Sentry feature, auto-fill, detergent & chemical connections, interchangeable upper & lower spray arms, automatic drain valve, vent fan control, bottom mounted HMI controls, mounted water PRV, stainless steel construction, electric tank heat, peg rack, flat rack, 2 HP self draining pump, NSF, cULus, ENERGY STAR®

Accessories:

- 1 ea. Fuel Surcharge
- 1 ea. 1 year parts & labor warranty, standard
- 1 ea. Extended warranty (consult factory for price)
- 1 ea. Complimentary factory authorized performance test included, upon equipment start-up. Consult local Champion sales representative for coordination of the start-up. If customer is beyond 60 miles from Champion authorized service agent, consult factory.
- 1 ea. Single-point electrical connection, standard
- 1 ea. 208-240v/60/3-ph
- 1 ea. Straight-through design application
- 1 ea. Model 117084 Drain water tempering kit, shipped loose (unmounted)
- 1 ea. Flanged feet
- 1 ea. Champion ION scale prevention system, shipped un-mounted
- 1 ea. Model 101273 Flat Bottom Dishrack, 20" x 20", additional
- 1 ea. Model 101285 Peg Dishrack, 20" x 20", additional
- 1 ea. Model 114356 Sheet pan rack
- 1 ea. Model 115412 Insulated Tray/Steam Table pan rack

ITEM #15 BLAST CHILLER/SHOCK FREEZER, REACH-IN

Quantity: One (1)

Manufacturer: Irinox North America Model: MULTIFRESH MF 70.1L PLUS

Status: CFCI

MultiFresh® Blast Chiller/Shock Freezer PLUS version, Reach-in: high cabinet, (14) 18" x 26" full size sheet pans or (28) 12" x 20" x 2-1/2", 155lbs. blast chill/freeze capacity from finished cooked temperature 194°F to 37°F in approximately 90 minutes or from finished cooked temperature 194°F to 0°F in approximately 4 hours on average, door hinged left, touch pad controls, (4) standard chilling and freezing cycles, an additional (122) dynamic chef designed, icon-controlled product specific cycles, able to customize and record replicable cycles, favorites menu, WIFI or USB for data transfer to HACCP software, low temperature cooking & automatic chill,

freeze, or hot hold (cook & hold), thawing, proofing, regeneration, holding, dehydration, pasteurization, and chocolate melting cycles, Temperature range 185° F to -40°F*, multi-sensor temperature probe, automatic SANIGEN® sanitation system, 304 grade stainless steel construction, Self contained efficient, IRINOX BALANCE SYSTEM® air-cooled condensing unit, (4) hp compressor rating, 6" stainless steel adjustable legs, installation not included, cULus, UL EPH Classified (compliant with NSF standards)

Accessories:

- 1 ea. (2) year parts and labor warranty, standard
- 1 ea. (5) year compressor warranty, standard
- 1 ea. With 6 racks, standard
- 1 ea. Self-contained, air-cooled energy efficient condensing unit, standard
- 1 ea. 208v/60/3-ph, 6.7 kW, 26.8 amps (NOTE: This unit requires a dedicated 30 amps circuit)
- 1 ea. Opposite door hanging (hinge on the right)
- 1 ea. Sous-vide probe
- 1 ea. Additional core probe
- 1 ea. Core probe holder for liquids
- 1 ea. Additional angle slides, set of 2

ITEM #16 HEATED CABINET, INTERMEDIATE HEIGHT

Quantity: Four (4) Manufacturer: Cres Cor Model: H137SUA9D

Status: CFCI

Cabinet, Mobile Heated, intermediate height, insulated, top-mount heater assembly, magnetic latch, recessed push/pull handles, (9) sets of chrome plated wire universal angle slides on 4-1/2" centers adjustable 1-1/2" centers, solid state electronic control, LED digital display, field reversible doors, (4) heavy duty 5" swivel casters (2) braked, anti-microbial latches, stainless steel exterior & interior, NSF, cCSAus, ENERGY STAR®

Accessories:

- 4 ea. Standard Warranty: 1 year labor with 3 year parts warranty 4 ea. 120v/60/1-ph, 1.5 kW, 12 amp, 10 ft. power cord, standard
- 4 ea. Model 1056 002 Corner Bumpers, add 2" to OA dimensions, non-marking, gray
- 4 ea. Model 1265 000 SIDE Bail Handle Kit, side mounted (4 per kit)

ITEM #17 COMBI OVEN, GAS

Quantity: Three (3)

Manufacturer: RATIONAL

Model: ICP 20-FULL NG 208/240V 1 PH (LM100GG)

Status: CFCI

Model ICP 20-FULL NG 208/240V 1 PH (LM100GG) (CG1GRRA.0000245) iCombi Pro® 20-Full Size Combi Oven, natural gas, (20) 18" x 26" sheet pan or (40) 12" x 20" steam pan or (20) 2/1 GN pan capacity, mobile oven rack & (10) stainless steel grids included, intelligent cooking system with (4) assistants; iDensityControl, iCookingSuite, iProductionManager, & iCareSystem, (6) operating modes, (5) cooking methods, (3) manual operating modes, 85° to 572°F temperature range, quick clean, care control, eco mode, 6-point core temperature probe, retractable hand shower, Ethernet interface, Wi-Fi enabled, includes (1) bucket of Active Green Cleaner & (1) bucket of Care Tabs, 303,500 BTU, 208/240v/60/1-ph, 6 ft. cord, 2.2 kW, IPX5, cCSAus, NSF, ENERGY STAR-®

Accessories

3 ea. 2 years parts and labor, 5 years steam generator warranty

- 3 ea. Model CAP Chef Assistance Program, a RATIONAL certified Chef conducts 4 hours/location specialized application training with personnel, no charge
- 3 ea. Model 1900.1150US Water Filtration Double Cartridge System, for full-size Combi-Duos or if used for more than (2) units, includes: (1) double head with pressure gauge, (2) R95H filter & (1) filter installation kit (for each additional unit add (1) additional head & additional cartridge. Maximum (4) cartridges)
- 3 ea. NOTE: The RATIONAL Water Filtration Systems helps provide consistent high quality water to your RATIONAL cooking systems. The patented carbon block technology reduces the effects of sediment, chloramines and chlorine while providing the required flow rates

ITEM #18 FLOOR TROUGH

Quantity: Two (2)

Manufacturer: Eagle Group

Model: FT-1896-SG

Floor Trough, 96"W x 18"D, stainless steel subway-style grating, 4" deep trough pan with built-in pitch toward drain, accommodates up to 4" drain pipe, stainless steel removable perforated basket, 1" outer flange for mounting, all-welded 14/304 stainless steel construction, NSF

Accessories:

2 ea. ADA-compliant grating

ITEM #19 EXHAUST HOOD AND S/S WALL LINING

Quantity: One (1)

Manufacturer: CAPTIVE AIRE (or equal)

Model: 6024-ND-2-PSP-F

Status: CFCI

To be stainless steel type I exhaust hood. Hood to be 18-gauge stainless steel with removable Captrate Solo Filter cartridges. See drawings for dimensions. The exhaust hood is to have 3" air space at back. Provide 200-watt lights pre-wired to one (1) point of connection as the configuration is shown on the drawings.

- A. 18-gauge stainless steel wall panels (minimum length to be 36") per California Mechanical Code Chapter 5. Wall lining to be applied with Dow Corning #995 adhesive. "Liquid Nails" are not acceptable.
- B. Wall panels shall be installed horizontally and fluted vertically every 6" from top of floor base to bottom lip of the hood
- C. Wall lining shall be installed without exposed screws and bolts.
- D. Provide stainless steel "tees" and/or "ells" at each panel on both sides, bottom and top.
- E. The stainless-steel wall lining shall extend the full length of the exhaust hood Item including the fire system cabinet on the end of the hood.
- F. Insulated wall lining shall meet the requirements of NFPA-96 and all local codes and ordinances.
- G. Provide 18-gauge stainless steel closure skirting from top of the hood to finish ceiling.
- H. Provide all hanging information to the Contractor including the total weight of the hood.
- I. Furnish all necessary materials to support this assembly from the building structure. Assembly shall meet the requirements of NFPA-96 and the latest edition of the California Mechanical Code.
- J. 18-gauge stainless steel wall lining with a 1-inch mineral wool blanket and wire mesh backing or ceramic fiber and backing spaced out 1-inch on non-combustible spacers per California Mechanical Code 2019 Chapter 5.
- K. Current exhaust hood configuration, DCV set up to provide 0-10v speed signal and does not include VFDs for the fans. Refer to foodservice equipment exhaust hood details.

ITEM #19.1 FIRE SYSTEM

Quantity: One (1)

Manufacturer: CAPTIVE AIRE / ANSUL

Model: R-102 Status: CFCI

Complete with a stainless-steel control panel, remote pull station, all shut/down electric contractors. This assembly to be in compliance with NFPA 96 and UL-300.

- A. All exposed piping, fittings, nozzles, and trim shall be stainless steel or chrome plated finish.
- B. All conduit piping and boxes are to be concealed in the building wall or ventilator. Verify with contractors to coordinate installation in the wall areas.
- C. Furnish a mechanical gas shut-off valve of proper size to the Plumbing Contractor for installation. Verify with Electrical Contractor what type of electrical panel will be furnished, either for shunt trips or contactors, and provide all necessary information regarding the inter-lock conduit and wiring between this electrical panel and the fire suppression panel. This electrical work and all material to be supplied by the Electrical Contractor.
- D. Coordinate with the hood manufacturer to supply the proper access into the hood area for the fire suppression linkage and nozzle locations.
- E. Before installation of the fire suppression system is started, approved drawings and fitting lists must be approved by the Office of Regulation Services. Once the installation is completed a field test must be performed in the presence of the inspecting authority.

ITEM #20 TILTING SKILLET BRAISING PAN, ELECTRIC

Quantity: One (1)

Manufacturer: RATIONAL

Model: IVARIOPRO L 208/240V 3PH (LMX100CE)

Status: CFC

Model IVARIOPRO L 208/240V 3PH (LMX100CE) (WX9ENRA.0002215) iVario Pro L Multifunctional Cooking Center, (1) 26 gallon pan,integrated iVarioBoost energy management system, 85° to 480°F temperature range, iZoneControl with up to (4) individually controlled heating zones, iCookingSuite intelligent cooking system, 6-point sensor core temperature probe, AutoLift (baskets and arm required for use), portioned water dispenser, retractable hand shower, Ethernet interface, WiFi enabled, includes stand with plastic feet, 208/240v/60/3-ph, 23.0 kw, CE, ETL, NSF, IPX5

Accessories:

- 1 ea. Model 1900.1154US Water Filtration Single Cartridge System, for any iVario, single Combi model, or XS or half-size Combi-Duos, includes: (1) single head with pressure gauge, R95H filter & filter installation kit
- 1 ea. NOTE: The RATIONAL Water Filtration Systems helps provide consistent high quality water to your RATIONAL cooking systems. The patented carbon block technology reduces the effects of sediment, chloramines and chlorine while providing the required flow rates
- 1 ea. NOTE: All public water systems using surface water and most ground water systems treat with either chlorine/chloramine or chlorine dioxide (EPA will allow levels as high as 4ppm safe for drinking water, exceeding our maximum level of .2ppm.
- 1 ea. Model 60.72.905 Unit anchoring kit, for size L and XL

ITEM #21 SPARE

ITEM #22MOBILE WORKTABLE WITH UTENSIL DRAWER

Quantity: One (1)

Manufacturer: American Stainless-Steel Corp. (or equal)

Model: FABRICATED ITEM

Status: CFCI

Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

- A. Work area top to be 14-gauge stainless steel with 2" turn down on all four sides.
- B. Provide and install 16-gauge stainless steel tubular legs, stainless steel welded leg sockets, and fully welded stainless-steel cross rail bracing. Provide 16-gauge stainless steel undershelf as shown.
- C. Provide swivel expanding stem casters Component Hardware Group, Inc. (4) ea. Model CMS4- 4GBN brake model.
- D. Provide (2) ea. utensil drawer Component Hardware Group, Inc. Model S90-0020N drawer mounted to the underside of mobile worktable Item No. 15. Provide all necessary hardware mounting angles etc. for a complete installation. Slides to be installed so drawer will roll closed when released.

ITEM #23 BUN / SHEET PAN RACK

Quantity: Three (3) Manufacturer: Cambro Model: UPR1826FA40580

Status: CFCI

Camshelving® Ultimate Sheet Pan Rack, 25-1/2W x 32-1/6"L x 71-7/8"H, full size unit, 1-1/2" rail spacing, molded positioning ribs, (40) full-size Camtray® (1826) or (80) half-size Camtray® (1318) capacity, temperature range -36°F (-38°C) to 190°F (88°C), 55 lbs. per shelf/350 lbs. per rack, (2) locking (2) non-locking 5" centerstem non-marking metal swivel casters, composite plastic, brushed graphite (ships fully assembled)

Accessories:

- 3 ea. 1 yr standard warranty
- 3 ea. Lifetime warranty against rust and corrosion for frame and rail panels only
- 3 ea. Model GBIRC272162110 GoBag® Rack Cover, 27" x 21" x 62", insulated, nylon, black

ITEM #24 PASS-THRU HEATED CABINET

Quantity: One (1) Manufacturer: Traulsen Model: RHF232WP-HHG

Status: CFCI

Spec-Line Heated Cabinet, Pass-thru, two-section, stainless steel exterior and interior, standard depth cabinet, half-height glass door or doors with Santoprene® EZ-Clean Gaskets, (3) clear coated adjustable shelves per section, microprocessor controls, 6" adjustable stainless steel legs, NSF, UL rated

Accessories:

- 1 ea. 208/115v/60/1-ph, 15.5 amps, standard 1 ea. 3 year service/labor warranty, standard
- 1 ea. Thermometer side: Left door hinged left/right hinged right, standard
- 1 ea. Rear: Left door hinged left/right hinged right, standard
- 1 ea. Fluorescent lights with exterior switch
- 1 ea. Stainless Steel flanged feet, 6" high (set of 4)

ITEM #25 PASS-THRU REFRIGERATOR

Quantity: One (1)

Manufacturer: Traulsen Model: RHT132WP-FHG

Status: CFCI

Spec-Line Refrigerator, Pass-thru Display, one-section, designed for remote refrigeration, stainless steel exterior and interior, standard depth, wide full-height glass door on both sides with Santoprene® EZ-Clean Gaskets, interior lights, (3) adjustable wire shelves per section, microprocessor controls, 6" adjustable stainless steel legs, cULus, NSF

Accessories:

1ea. 115v/60/1-ph, 5.4 amps, cord & plug not included, standard

1 ea. R407A TXV, standard

1 ea. Thermometer side door: hinged on right, standard

1 ea. Rear door hinged on right, standard

1 ea. Stainless Steel Flanged legs, 6" high (set of 4)

ITEM #26 HAND SINK

Quantity: One (1)

Manufacturer: Advance Tabco

Model: 7-PS-68 Status: CFCI

Hand Sink, wall mounted, 14" wide x 10" front-to-back x 5" deep bowl, 20 gauge 304 stainless steel, with splash mounted gooseneck faucet with wrist blades, basket drain, wall bracket, NSF, cCSAus

Accessories:

1 ea. Model 7-PS-10 P-trap, heavy duty, 1-1/2", 17 gauge

1 ea. Model 7-PS-15 Welded Side Splash, 12"H (installed height), both sides, for hand sinks with 14" wide x 10" front-to-back bowl, splash mounted faucets

ITEM #27 DISPLAY MERCHANDISER, HEATED, FOR MULTI-PRODUCT

Quantity: Two (2) Manufacturer: Hatco Model: GRSDS-41D

Status: CFCI

Glo-Ray® Merchandising Warmer, countertop, 41" long, (16) rods, pass thru design, with (2) shelves, forward-slanted shelves, pre-focused infrared top heat, tempered glass sides, stainless steel & aluminum construction, 4" legs, 2120 watts, cULus, UL EPH Classified, Made in USA

Accessories:

- 2 ea. NOTE: Includes 24/7 parts & service assistance, call 800-558-0607
- 2 ea. One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements
- 2 ea. (2) 120v/60/1-ph, 1090/1030 watts, 9.1/8.6 amps, (2) NEMA 5-15P (domestic voltage)
- 2 ea. Model BLACK Black, designer housing color (available at time of purchase only)
- 2 ea. The color selected is not the default Glossy Gray & is considered custom & is NOT returnable
- 2 ea. Open Customer Side, upper, standard
- 2 ea. Open Customer Side, lower, standard

ITEM #28 SPARE

© DARDEN ARCHITECTS, INC. 11 40 00 - 23 9/19/2022

ITEM #29 SPARE

ITEM #30 OPEN DISPLAY MERCHANDISER

Quantity: One (1)

Manufacturer: MVP Group LLC

Model: KGL-RS-60-S

Status: CFCI

Hydra-Kool Grab-N-Go Open Merchandiser, 60-5/8"W x 36"D x 65"H, digital temperature, (2) locking rear loading doors, key operated electrical front shutter, (2) adjustable shelves, LED lighting in canopy & under all shelves, tempered side glass, black foamed polystyrene end panels, gray PVC coated steel interior & exterior, black steel kick plate, levelling feet, self-contained refrigeration, 3/4 HP, ETL-Sanitation, cETLus

Accessories:

1 ea. 1 year parts & labor warranty, standard

1 ea. 1 Year Parts & Labor, 4 additional years on compressor (self-contained units only), standard

1 ea. 120v/60/1-ph, 25.0 amps, standard

1 ea. Silver PVC coated steel front panel, black foamed polystyrene end panels, black steel kick plate, standard

1 ea. Stainless steel interior finish

ITEM #31.1 SERVING COUNTER

Quantity: One (1) Manufacturer: Duke

Model: FABRICATED ITEM

Status: CFCI

ITEM #32 SERVING COUNTER

Quantity: One (1) Manufacturer: Duke

Model: FABRICATED ITEM

Status: CFCI

ITEM #32.1 SERVING LINE

Quantity: One (1)
Manufacturer: Custom
Model: FABRICATED ITEM

Status: CFCI

ITEM #33 WORK COUNTER

Quantity: One (1)

Manufacturer: American Stainless-Steel Corp. (or equal)

Model: Fabricated Item

Status: CFCI

Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

- A. Work area top to be 14-gauge stainless steel with a 14-gauge stainless steel backsplash at back 2" thick with a 45-degree top edge to wall, turn down ½" at back.
- B. Top to be constructed with square edge 2" turn down at front edge with 1" return back.
- C. Legs to be 16-gauge stainless steel tubular, stainless steel welded leg sockets, stainless steel adjustable feet and stainless-steel cross rail bracing. Provide 16-gauge stainless steel under shelf as shown.
- D. Approximate size: 30" deep x Length as shown.

ITEM #34 WALL MOUNTED OVER SHELF

Quantity: One (1)

Manufacturer: Custom (or equal) Model: FABRICATED ITEM

Stat: CFCI

- A. To be 16-gauge stainless steel construction, 1 1/2" turn down in front and 2" turn up at back and right end and left ends. Provide 14-gauge stainless steel wall brackets as shown.
- B. Approximate Size: (1) ea.12" deep x length as shown.

ITEM #35 REACH-IN REFRIGERATOR

Quantity: One (1)

Manufacturer: True Mfg. - General Foodservice

Model: STG2R-2G-HC

Stat: CFCI

SPEC SERIES® Refrigerator, reach-in, two-section, (2) glass doors with locks, cam-lift hinges, digital temperature control, (6) gray shelves, LED interior lights, stainless steel front, aluminum sides, aluminum interior, 5" castors, R290 Hydrocarbon refrigerant, 1/2 HP, 115v/60/1-ph, 5.9 amps, NEMA 5-15P, cULus, UL EPH Classified, Made in USA, ENERGY STAR®

Accessories:

- 1 ea. Warranty 7 year compressor (self-contained only), please visit www.Truemfg.com for specifics
- 1 ea. Warranty 3 year parts and labor, please visit www.Truemfg.com for specifics
- 1 ea. Left door hinged left, right door hinged right standard
- 1 ea. (3) vinyl shelves and shelf supports standard per section
- 1 ea. Seismic/flanged legs, 6", set of 4

ITEM #36 WORK COUNTER

Quantity: One (1)

Manufacturer: American Stainless-Steel Corp. (or equal)

Model: Fabricated Item

Status: CFCI

Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

- A. Work area top to be 14-gauge stainless steel with a 14-gauge stainless steel backsplash at back 2" thick with a 45-degree top edge to wall, turn down ½" at back.
- B. Top to be constructed with square edge 2" turn down at front edge with 1" return back.
- C. Legs to be 16-gauge stainless steel tubular, stainless steel welded leg sockets, stainless steel adjustable feet and stainless-steel cross rail bracing. Provide 16-gauge stainless steel under shelf as shown.
- D. Approximate size: 30" deep x Length as shown.

ITEM #37 WALL MOUNTED OVER SHELF

Quantity: One (1)

Manufacturer: Custom (or equal) Model: FABRICATED ITEM

Stat: CFCI

A. To be 16-gauge stainless steel construction, 1 1/2" turn down in front and 2" turn up at back and right end and left ends. Provide 14-gauge stainless steel wall brackets as shown.

B. Approximate Size: (1) ea.12" deep x length as shown.

ITEM #38 PREP SINK

Quantity: One (1)

Manufacturer: American Stainless-Steel Corp. (or equal)

Model: FABRICATED ITEM

Status: CFCI

Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

- A. One (1) 14-gauge stainless steel formed and welded integral sink, refer to drawings for bowl dimensional requirements. (Diecast sink bows are not acceptable). Sink to be fully welded into counter top of Item #36 Work Counter
- B. Twist waste valve to have support bracket installed as part of fabrication with a minimum of 4" clearance from twist handle.

 Accessories:
- 1 ea. Fisher Model 22209 DrainKing Waste Valve, with flat strainer, 12 GPM drain rate, dual Teflon seals, stainless steel ball, cast red brass body
- 1 ea. Fisher Model 60917 Faucet, backsplash mount, 8" centers, 10" swing spout, lever handles with color-coded indexes, 1/2" NPT male inlets, with elbows, stainless steel, CSA, ADA Compliant
- 2 ea. Fisher Model 5000-2103 Close Elbow, 3/4" female, rough chrome

ITEM #39 HOT / COLD FOOD WELL UNIT, DROP-IN, ELECTRIC

Quantity: Two (2)

Manufacturer: Low Temp Industries

Model: DI-OSCHP-3

Status: CFCI

Hot/Cold/Freeze Food Well, drop-in, 49-1/2"W x 26-3/4"D x 21-16/25"H, 14ga stainless steel top, accommodates (3) 12" x 20" pan size, wired remote, individual wired remote digital controls for hot or cold operation, manifold drain, stainless steel top & wells, galvanized exterior, cULus, ANSI/NSF 4, ANSI/NSF 7

Accessories:

1 ea. 120/208v/60/1-ph, 12.0 amps, NEMA 14-20P

ITEM #40 SNEEZE GUARD W/ LIGHTS

Quantity: One (1) Manufacturer: Duke

Model: FABRICATED ITEM

Status: CFCI

ITEM #41 SERVING COUNTER

Quantity: One (1) Manufacturer: Custom

Model: FABRICATED ITEM

Status: CFCI

ITEM #42 DISPLAY MERCHANDISER, HEATED, FOR MULTI-PRODUCT

Quantity: One (1)
Manufacturer: Hatco
Model: GRSDS-36
Status: CFCI

Glo-Ray® Merchandising Warmer, countertop, 36" long, (7) rods, pass thru design, with forward slanted shelf, pre-focused infrared top heat, tempered glass sides, stainless steel & aluminum construction, 4" legs, 935 watts,

cULus, UL EPH Classified, Made in USA

Accessories:

1 ea. One year on-site parts & labor warranty, plus one additional year parts only warranty on all Glo-Ray metal sheathed elements

1 ea. 120v/60/1-ph, 935 watts, 7.8 amps, NEMA 5-15P (domestic voltage), standard 1 ea. Model GGRAY Glossy gray, gloss finish, (available at time of purchase only)

1 ea. Open Customer Side, standard

ITEM #43 HEAT LAMP

Quantity: Two (2)

Manufacturer: Nemco Food Equipment

Model: 6151-48 Status: CFCI

Bar Heater, single, infinite temperature control, 48" x 6-3/4" x 2-3/4", infrared heating element, indicator light, aluminum shell, 120v/60/1-ph, 1100 watts, 9.2 amps, cETLus, NSF

Accessories:

2 ea. 1 year parts & labor warranty, standard

2 ea. Model 66099 Wire Leg Set, 16" H, for strip heater

2 ea. Model 45390 Thermostat

2 ea. Model 45740 Knob, Thermostat

2 ea. Model 45758-48 Element

ITEM #44 HEATED SHELF FOOD WARMER

Quantity: Two (2) Manufacturer: Hatco Model: HBGB-4818

Status: CFCI

Heated Base Glass Shelf, built-in, 48"L, ceramic glass surface, uniform heat, 100° - 200°F thermostatic control with lighted on/off rocker switch, choice of frame finish, cULus, UL EPH Classified

Accessories:

2 ea. NOTE: Includes 24/7 parts & service assistance, call 800-558-0607

- 2 ea. 1-Yr Warranty on Blanket Heating Elements against burnout, standard
- 2 ea. 120v/60/1-ph, 850 watts, 7.1 amps, NEMA 5-15P (domestic voltage), standard
- 2 ea. NOTE: Recommended for use in metallic countertop, verify that the material is suitable for temperatures up to 200°F
- 2 ea. Model HBGB-GLASS-BLK Black finished ceramic glass, standard
- 2 ea. Model HBGB-TRIM-BLK Designer Black powder coated trim ring
- 2 ea. The color selected is considered custom & is NOT returnable
- 2 ea. Model HBGB-BEZEL-BLK Designer black finished bezel, for control box
- 2 ea. The color selected is considered custom & is NOT returnable
- 2 ea. Flat top surface, standard
- 2 ea. Thermostat control with lighted rocker switch, standard

ITEM #45 OPEN DISPLAY MERCHANDISER

Quantity: Two (2)

Manufacturer: MVP Group LLC

Model: KGL-RS-60-S

Status: CFCI

Hydra-Kool (add to project to see surcharge) Grab-N-Go Open Merchandiser, 60-5/8"W x 36"D x 65"H, digital temperature, (2) locking rear loading doors, key operated electrical front shutter, (2) adjustable shelves, LED lighting in canopy & under all shelves, tempered side glass, black foamed polystyrene end panels, gray PVC coated steel interior & exterior, black steel kick plate, levelling feet, self-contained refrigeration, 3/4 HP, ETL-Sanitation, cETLus

Accessories:

- 2 ea. 1 year parts & labor warranty, standard
- 2 ea. 1 Year Parts & Labor, 4 additional years on compressor (self-contained units only), standard
- 2 ea. 120v/60/1-ph, 25.0 amps, standard
- 2 ea. Silver PVC coated steel front panel, black foamed polystyrene end panels, black steel kick plate, standard
- 2 ea. Stainless steel interior finish

ITEM #46 POS CART

Quantity: One (1)

Manufacturer: Serv Smart

Model: DF-21

ITEM #47 THREE STACK UTENSIL DRAWER UNIT

Quantity: Two (2)

Manufacturer: American Stainless-Steel Corp. (or equal)

Model: FABRICATED ITEM

Status: CFCI

Fabricated assembly in length and configuration as shown on the drawings and shall include the following: To be fabricated of 16-gauge stainless steel complete with the following hardware items. This item to be a part of Item #48 Chefs Counter

A. Provide stainless steel flush pull, Component Hardware Group, Inc., model no. P63-1012, installed into the 18-gauge double-pan drawer front panel.

- B. Provide stainless steel locks, Component Hardware Group, Inc., model no P30-4781 for each drawer. All drawers are to be keyed alike.
- C. Provide stainless steel full extension slides, Component Hardware Group, Inc., model No. S52-0024. Provide two (2) per drawer. Slides to be installed so drawer will roll closed when released.
- D. Provide stainless steel removable drawer pan. Provide Component Hardware Group, Inc., model No. S81-1520 one (1) per drawer. Pan should be easily lifted out of drawer frame for cleaning.
- E. Drawer face panel to be constructed of 16-gauge stainless steel double pan construction. Single metal drawer faces are not acceptable.

ITEM #48 CHEFS SINK

Quantity: One (1)

Manufacturer: American Stainless-Steel Corp. (or equal)

Model: FABRICATED ITEM

Status: CFCI

Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

- A. Sink to be one (1), 14-gauge stainless-steel formed and welded sink, refer to drawings for bowl dimensional requirements. (Diecast sink bows are not acceptable). Sink to be fully welded into countertop Item #50.
- B. This item is to be included as part of the fabrication of Item #50. Accessories:
- 1 ea. Fisher Model 57657 Faucet, deck mount, 8" centers, 10" swing spout, lever handles with color coded indexes, 1/2" male inlets, stainless steel, ADA Compliant
- 1 ea. Fisher Model 22209 DrainKing Waste Valve, with flat strainer, 12 GPM drain rate, dual Teflon seals, stainless steel ball, cast red brass body
- 1 ea. Fisher 5-year warranty against defects in materials or workmanship, standard
- 2 ea. Fisher Model 5000-2103 Close Elbow, 3/4" female, rough chrome

ITEM #49 MOBILE WORKTABLE WITH UTENSIL DRAWER

Quantity: One (1)

Manufacturer: American Stainless-Steel Corp. (or equal)

Model: FABRICATED ITEM

Status: CFCI

Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

- A. Work area top to be 14-gauge stainless steel with 2" turn down on all four sides.
- B. Provide and install 16-gauge stainless steel tubular legs, stainless steel welded leg sockets, and fully welded stainless-steel cross rail bracing. Provide 16-gauge stainless steel undershelf as shown.
- C. Provide swivel expanding stem casters Component Hardware Group, Inc. (4) ea. Model CMS4- 4GBN brake model.
- D. Provide (2) ea. utensil drawer Component Hardware Group, Inc. Model S90-0020N drawer mounted to the underside of mobile worktable Item No. 15. Provide all necessary hardware mounting angles etc. for a complete installation. Slides to be installed so drawer will roll closed when released.

ITEM #50 CHEF'S COUNTER

Quantity: One (1)

Manufacturer: American Stainless-Steel Corp. (or equal)

Model: FABRICATED ITEM

Status: CFCI

Fabricated assembly in length and configuration as shown on the drawings and shall include the following: To be constructed of 14-gauge stainless steel complete with stainless steel finished ends and back. Provide accessible work area as shown.

- A. Top to be 14-gauge stainless steel complete with 2" turn downs on 4 sides and a working height of 2'-10".
- B. Base section to be 16-gauge stainless steel formed metal construction complete with 16-gauge stainless steel bottom and mid shelves. Provide accessible work area as shown.
- C. Provide 1 5/8" dia. Stainless steel tube legs with Component Hardware Group, Inc. A10-0851 adjustable foot insert.
- D. Provide (2) Component Hardware Group, Inc., model No. R58-1020 double-faced pedestal type electrical outlets with model No. R71-0721 stainless steel face plates. All electrical outlets to be provided with empty conduit all interconnected to one point connection at end of counter.
- E. Items to be included as part of this are items 47, 51, and 52.
- F. Provide adjustable seismic flanged feet. Refer to drawings for configuration and quantity.

ITEM #51 DOUBLE MOUNTED OVER SHELF

Quantity: One (1)

Manufacturer: American Stainless-Steel Corp. (or equal)

Model: Fabricated Item

Status: CFCI

Fabricated assembly in length and configuration as shown on the drawings and shall include the following:

- A. 16-gauge stainless steel shelves mounted on 1 5/8" dia. 16-gauge stainless steel tubular uprights anchored to bottom of base cabinet Item No. 50.
- B. Shelf is to be two tiered and have 1½" turned-down edge on all sides. Countertop of Item #50 to be coved up around the tubular uprights where the uprights penetrate the top.

ITEM #52 POT RACK

Quantity: One (1)

Manufacturer: Eagle Group

Model: TM60PR Status: CFCI

Pot Rack, table mount, 52"W x 20"D, triple-bar design with tubular table supports, constructed of 3/16" x 2" stainless steel flat bar, includes (15) double-pronged pot hooks, for 60"W table, NSF. Pot rack to extend to base of item #50 and be fully welded. Countertop of Item #50 to be coved up around the tubular uprights where the uprights penetrate the top.

Accessories:

25 ea. Model 300696 Pot Hook, stainless steel

ITEM #53 PIZZA PREPARATION REFRIGERATOR

Quantity: One (1)

Manufacturer: True Mfg. Model: TPP-AT-60-HC

Status: CFCI

Pizza Prep, 33 - 41°F pan rail, stainless steel cover, 19-1/2"D cutting board, (2) full doors, (4) PVC coated adjustable wire shelves, includes: (8) 1/3 size clear polycarbonate insert pans (top), stainless steel front, top & sides, aluminum interior with stainless steel floor, 5" castors, front breathing, R290 Hydrocarbon refrigerant, 1/4 HP, 115v/60/1-ph, 3.9 amps, NEMA 5-15P, UL EPH Classified, cULus, CE, Made in USA

Accessories:

- 1 ea. Self-contained refrigeration standard
- 1 ea. Warranty 7 year compressor (self-contained only), please visit www.Truemfg.com for specifics
- 1 ea. Warranty 3 year parts and labor, please visit www.Truemfg.com for specifics
- 1 ea. 5" Castors, standard

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 22 00 00 - PLUMBING

PART 1: - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS:

The General Mechanical Provisions, Section 23 00 00, shall form a part of this Section with A. the same force and effect as though repeated here.

1.2 SCOPE:

- Included: Provide all labor, materials and services necessary for complete, lawful and A. operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:
 - Sanitary sewer system. 1.
 - 2. Domestic water system.
 - 3. Fuel gas system.
 - 4. Drain system (including condensate drain).
 - 5. All equipment as shown or noted on the drawings or as specified.
 - Lead Free: All equipment, fixtures, valves and fixture stops providing water for 6. human consumption installed after January 1, 2010, must meet the "Lead Free" requirements for the State of California.

B. Work Specified Elsewhere:

- Line voltage power wiring, disconnect switches and installation of all starters are 1. included in the Electrical Section unless otherwise noted.
- 2. Concrete and reinforcing steel unless specifically called for on the drawings or specifications.
- Painting unless specifically called for in the drawings or specifications. 3.
- 4. Carpentry.
- Control of circulating pumps, etc. 5.

PART 2: - PRODUCTS

2.1 PIPING MATERIALS:

A. Sanitary Sewer:

Soil, Waste and Vent Piping (Non-Pressurized) - Inside Building, Within Five Feet of Building Walls to Civil P.O.C.: Standard weight coated cast iron pipe and fittings. Plain end, CISPI 301, ASTM A888, or hub end with rubber gaskets, ASTM A74, ASTM C564. ABI, Charlotte, Tyler. Couplings shall be heavy-duty shielded couplings, Type 304 stainless steel, with neoprene gasket, ASTM C-1540. Husky HD 2000, Clamp-All 80, Mission HeavyWeight. MG Couplings are also acceptable. 2" and smaller exposed to view shall be galvanized steel, ASTM A53, with coated cast iron recessed drainage fittings, ANSI B16.12.

Where required by soil conditions, as determined by the method described in ASTM A74-09, Appendix X2, below grade cast iron pipe and fittings shall have 8 mil (minimum) Polyethylene Encasement (Poly Wrap), Per ANSI/AWWA C105/A21.5.

- 2. Cleanouts: Comparable models of Josam, Wade, Mifab or Zurn are acceptable. Grease plug prior to installation. Floor Cleanouts: Smith 4023 with nickel bronze top in finished areas; Smith 4223 in utility areas. Wall Cleanouts: Smith 4532 with stainless steel cover and screw. Pipe Cleanouts: Iron body with threaded brass plug. Site cleanouts more than 5' outside building may be PVC with PVC plug.
- 3. Cleanout Box: Precast reinforced concrete. Cast iron lid marked for service. Christy F8 in foot traffic areas; G5 in roadways. Provide with PVC pipe extension down to top of pipe.

B. Water and Gas:

- Hot and Cold Water Piping: Materials used in the water system, except valves and similar devices, shall be of like material, except where otherwise approved by Engineer and Authority Having Jurisdiction, prior to start of work. For existing water systems of galvanized steel or copper, materials shall match existing.
 - Inside Building, Within Five Feet of Building Walls, and All Above a. Grade:
 - (1) Schedule 40 galvanized steel pipe, ASTM A53. 150 psi galvanized malleable iron screwed fittings, ANSI B16.3. Galvanized steel shall have protective coating.
 - (2) Hard temper seamless copper, ASTM B88. Wrought copper -orfittings, ANSI B16.22. Type L with brazed joints (1100F, min.). 1-1/2" and smaller above grade may be soldered, 95-5 tinantimony solder. All nipples shall be lead-free red brass (85% copper). Above grade fittings may be copper press fittings, ASME B16.18 or ASME B16.22. EPDM O-rings. Installation shall be in accordance with the manufacturer's installation instructions. ProPress. [
- 2. Hot Water Piping:
 - Inside Building Above Slab: Same as Cold Water Piping Inside a. Building.
 - Outside Building or Below slab: Pre-insulated. Type L copper core. 1" b. foamed polyurethane insulation for less than 1" nominal pipe, 1-1/2" for 1" and larger nominal pipe. See Title 24, Part 6 "California Energy Code" for temperatures above 140°F. Polyvinyl chloride or high density polyethylene jacket. Sealed ends. Brazed joints (1100F, min.) Fittings shall be wrought copper, with brazed joints (1100F, min.). Provide anchor points and bolster pads as required. Submit shop drawing from manufacturer showing anchor points and bolster pad locations. Perma-Pipe/Ricwil, Thermacor, Thermal Pipe Systems.
- 3. Gas Piping:
 - Inside Building and All Above Grade: 2" and Smaller: Schedule 40 a. galvanized steel pipe, ASTM A53. 150 psi galvanized malleable iron screwed fittings, ANSI B16.3, ANSI B31.8. Flexible connections shall be corrugated stainless steel, CSA (US) approved. 2-1/2" through 4": May be screwed pipe as above or welded pipe as below. 6" and larger: Schedule 40 black steel pipe, ASTM A53. Standard weight carbon steel welding fittings, long radius ells, ANSI B16.9.
- Valves and Specialties: 4.
 - Valves:

- (1) General: Manufacturer's model numbers are listed to complete description. Equivalent models of Crane, Kitz, Milwaukee, Nibco, Stockham, Walworth or Watts are acceptable. All valves of a particular type or for a particular service shall be by the same manufacturer. Butterfly valves may be substituted for 2-1/2" and larger gate valves above grade; see specification below.
- (2) Gate Valve: 2" and Smaller: All bronze. Non-rising stem. Threaded bonnet. Wedge disk. Malleable iron handwheel. 200 psi CWP. Nibco T-113-LF. 2-1/2" and Larger: Iron body, bronze mounted. Non-rising stem. Resilient wedge. 200 psi CWP. Flanged or AWWA hub end as applicable. Nibco F-619-RWS. Underground valves shall have square operating nut.
- (3) Butterfly Valve: Ductile iron threaded lug body. Aluminum bronze disk. EPDM molded-in liner and seals. 416 stainless steel shaft. 6" and smaller valves shall have multi-position lever handle. 8" and larger valves shall have gear operator. Provide 2" extension neck at insulated pipes. Nibco LD-2000.
- (4) Check Valve: 2" and Smaller: Lead-free bronze swing check, regrinding. 200 psi CWP. Nibco T-413-Y-LF. For vertical applications use lead-free bronze, spring-loaded, lift-type. Nibco T-480-Y-LF. 2-1/2" and Larger: Iron body, flanged, bronze mounted, swing check. 200 psi CWP. Stockham G-931.
- (5) Ball Valve: Full port. Lead free brass body, cap, stem, disk and ball. Screwed connection. Lever handle. PTFE seat and stem packing. Min. 400 psi CWP. CSA-US and UL listed. Nibco T-FP-600A-LF.
- Plug Valve: Valves in gas piping systems must be UL or CSA (6) listed for gas distribution. Eccentric bronze or nickel plated semi-steel plug. Semi-steel body. Bronze bushings. Buna-N-rings. 175 psi WOG. KeyPort Valve Series 400. 2" and smaller above grade may be listed full port ball valves, except in publically accessible locations. Apollo, Jomar, Nibco.
- (7) Valve Box: Precast reinforced concrete. Cast iron lid marked for service. Christy F8 in foot traffic areas; G5 in roadways. Provide with PVC pipe extension down to top of pipe.

b. **Instruments:**

- Thermometer: 3" dial. Stainless steel case. Back or bottom (1) connected as required. 1/2" NPT. 20F-240F, 2F divisions for hot water. 25F-125F, 2F divisions for chilled water. 2" insertion length. Allowance to be made for insulation thickness. For installations over 7 feet above finish floor, provide digital thermometer with remote reader. Marshalltown, Moeller, Taylor, Tel Tru. Winters.
- (2) Thermometer Well: Brass well. Suitable for thermometer above. Provide 2" extension at insulated pipes.
- Pressure Gage: Phosphor bronze tube. Bronze bushed. 1% (3) accuracy. Cast aluminum case. 3-1/2" white dial. Adjustable pointer. Operating pressure at midscale. 1/4" NPT brass socket. Provide brass porous core pressure snubber and gage cock. Trerice, Weksler, Winters.

- (4) Gage Cock: Lever handle brass cock. 1/4" NPT connections.
- Instrument Well: Suitable for temperature sensing element. (5) Coordinate with supplier of temperature controls.
- Miscellaneous Specialties: c.
 - Temperature and Pressure Relief Valve: ASME rated fully (1) automatic, reseating combination temperature and pressure relief valve sized in accordance with energy input. Sensing element immersed within upper 6" of tank. Watts.
 - (2) Union: 2" and Smaller: AAR malleable iron, bronze to iron ground seat. 300 psi. Unions for copper piping shall be copper or lead free cast bronze. Anvil. Size 2-1/2" and Larger: Grooved pipe, synthetic gasket, malleable iron housing. EPDM gasket, NSF 61 rated. Victaulic Style 77, Gruvlok.
 - Dielectric Coupling: Insulating union or flange rated for 250 psig. (3) Wilkins DUXL Series.
 - Shock Absorber: Multiple bellows. All stainless steel construction. (4) Designed and applied in accordance with PDI WH201. Amtrol, Smith, Wade, Zurn.
- C. Drain Piping (including Condensate): Same as inside building cold water piping.
 - Condensate Drain Piping for Condensing Gas Fired Equipment: Schedule 40 CPVC piping with solvent weld fittings from equipment to neutralizing kit. Schedule 40 galvanized steel, ASTM A53 downstream of neutralizing kit. If no neutralizing kit, piping shall be CPVC to point of discharge.
- D. Flue and Intake Piping (Condensing Gas Fired Equipment): Schedule 40 CPVC piping with Schedule 40 CPVC solvent weld fittings. Install per equipment manufacturer's instructions.
- E. Miscellaneous Piping Items:
 - Pipe Support: 1.
 - Pipe Hanger: Steel "J" hanger with side bolt for piping 4" and smaller; a. steel clevis hanger for piping 5" and larger. Load and jam nuts. Size and maximum load per manufacturer's recommendation. Felt liner for copper piping. Hanger and rod shall have galvanized finish. B-Line, Anvil, Unistrut.
 - b. Isolating Shield: Galvanized steel shell and reinforcing ribs. 1/4" non-conducting hair felt pad. Pipe hanger in accordance with paragraph above. Increase hanger size per manufacturer's recommendation. B-Line, Semco, Superstrut.
 - Construction Channel: 12-gage, 1-5/8" x 1-5/8" galvanized steel channel. c. Single or multiple section. Self-locking nuts and fittings. B-Line, Anvil, Unistrut.
 - 2. Flashing: Vent flashing shall be 4 lb/ft2 lead, 16" sq. flange, length sufficient to be turned down 2" into vent. Oatey. Flashing for other piping through roof shall be prefabricated galvanized steel roof jacks with 16" sq. flange. Provide clamp-on storm collar and seal water tight with mastic. For cold process built-up roof, material shall be 4 lb/ft² lead instead of galvanized steel. For single-ply roofing, use the roofing manufacturer's recommended flashing material.

2.2 PIPING INSULATION MATERIALS:

- General: All piping insulation materials shall have fire and smoke hazard ratings as tested A. under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.
- B. Pre-Molded Fiberglass: Heavy density sectional pre-molded fiberglass with vapor barrier laminated all service jacket and pressure sealing vapor barrier lap. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft2-F at a mean temperature of 50F. Perm rating 0.02, ASTM E96. Puncture rating 50 Beach units, ASTM D781. Provide 3" (min.) wide tape of same material as lap for butt joints. For hot water piping to 140°F, thickness shall be 1" for pipe sizes less than 1"; 1-1/2" thickness for pipe sizes 1" and larger. See Title 24, Part 6 "California Energy Code" for temperatures above 140°F. Knauf, Johns-Manville, Owens-Corning.
- C. Fiberglass Blanket: Unfaced. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft2-F at a mean temperature of 50F. 1-1/2" thickness. Knauf, Johns-Manville, Owens-Corning.
- D. PVC Jacket (for pipe, fittings and valves): Pre-molded polyvinyl chloride (PVC) jackets, 0.020" thickness. Size to match application. Provide solvent weld adhesive and PVC vapor barrier pressure sealing tape by same manufacturer. Zeston.
- E. Aluminum Jacketing: Aluminum pipe and fitting jacketing, 0.016" thickness for straight pipe. 0.024" thickness for fittings. Integral moisture barrier. Stucco-Embossed finish. Provide pre fabricated aluminum strapping and seals by same manufacturer. ITW or RPR.
- F. Outdoor Weather Barrier Mastic: Childers CP-10/11, Foster 46-50.
- G. Metal Jacketing Sealant: Childers CP-76, Foster 95-44.
- H. Molded Closed Cell Vinyl (Piping Insulation Under Accessible Lavatories and Sinks): Fully molded closed cell vinyl, 1/8" thick, minimum. Thermal conductivity shall not exceed 1.17 BTU-in/hr-ft²-°F at an average temperature of 73°F. Weep hole in cleanout nut enclosure. Hinged cap over valve to allow access for servicing. Out of sight nylon fastening system and internal ribs on drain insulation to provide air gap (Lav-Guard Only). Truebro Lav-guard, McGuire Pro Wrap, Plumberex.

2.3 FIXTURES:

- A. General: Provide rough-in for and install all plumbing fixtures shown on drawings. Except in equipment rooms, all trim, valves and piping not concealed in wall structure, above ceiling or below floors, shall be brass with polished chrome plate finish, unless noted otherwise. All enameled fixtures shall be acid resisting. Standard color is white unless otherwise noted.
- B. Schedule: Refer to Plumbing Fixture Schedule on the drawings for list of fixtures and trim. Manufacturer's model numbers are listed to complete description. Equivalent models of American Standard, Elier, Elkay, Haws, Just, Kohler, T&S Brass, Willoughby or Zurn are acceptable. For drainage fixtures, equivalent models of Josam, Mifab, Smith, Wade or Zurn are acceptable.

- C. Stops and P-Traps: All fixtures shall be provided with stops and P-Traps as applicable. Wall mounted faucets, valves, etc. shall have integral stops or wall mounted stops.
 - Stops: All hot and cold water supplies shall be 1/2" I.P.S. inlet angle stops with 1. stuffing box, loose key lock shield, and brass riser (3/8" for 2-1/2 gpm and less, otherwise 1/2"). ¼ turn ball stops do not require stuffing box. Dahl. McGuire. Speedway.
 - 2. P-Traps: Semi-cast brass, ground joint. 17-gage. Clean-out plug. Unobstructed waterway. California Tubular, McGuire.
- D. Caulking: Caulk fixtures with white G.E. "Sanitary SCS1700", mildew resistant silicone sealant with EPA listed anti-microbial.

2.4 **EQUIPMENT:**

General Requirements: A.

- 1. Capacity: Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
- 2. Dimensions: Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Equipment will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.
- 3. Ratings:
 - Gas: Gas burning equipment shall be furnished with 100% safety gas a. shut-off, intermittent pilot ignition, and shall be CSA (US) or AGA certified.
 - h. Electrical: Electrical equipment shall be in accordance with NEMA standards and UL or ETL listed where applicable standards have been established.
- 4. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided. Equipment requiring domestic water for non-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.
- 5. Electrical:
 - General: Each item or assembly of items shall be furnished completely a. wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories and controls required by equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Manual and magnetic starters shall have ambient compensating running overcurrent protection in all ungrounded conductors. Magnetic starters shall be manual reset, and shall have H-O-A switches and auxiliary contacts. Controllers and other devices shall be in NEMA 1 or 3R enclosures as applicable.
 - Wiring: Conductors, conduit, and wiring shall be in accordance with b. Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts and other devices shall be in ungrounded conductors.

- Motors: Shall be rated, constructed and applied in accordance with NEMA c. and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Three-phase motors shall be open drip-proof, NEMA B design on pumps, NEMA C on reciprocating equipment, sealed ball bearing, three-phase induction, unless otherwise noted. Design shall limit starting inrush current and running current to values shown on drawings. Motors from 1 horsepower to 5 horsepower shall be the standard high efficiency type, Magnetek E-Plus. Motors 7-1/2 horsepower and larger shall be the premium efficiency type, tested according to IEEE Standard 112, Method B. Motors exposed to weather shall be TEFC. Vertical motors with exposed fans shall have rain caps.
- d. Starters: Motor starters shall be furnished for all equipment except where starter is in a motor control center as designated on the electrical drawings. Deliver starter to Electrical Contractor for installation and wiring.
- Control Voltage: Equipment connected to greater than 240 volts shall be e. provided with 120 volt control circuit from integral protected transformer if separate source is not indicated on plans. 240 volt control is acceptable if confined within control panel.
- f. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommended external wiring.
- B. Water Heater: Natural gas fired. Minimum 92% thermal efficiency. Shall be design certified by CSA for 180°F application. Tank shall be lined with Vitraglas® vitreous enamel and shall have a bolted hand hole cleanout. Tank shall have four extruded magnesium anode rods installed in separate head couplings. Water heater shall be equipped with stainless steel cold water inlet, Hydrojet® Sediment Reduction System. Heater shall be insulated with Non-CFC foam. Water heater shall be equipped with an electronic ignition system, an ASME rated T&P relief valve and a premix closed combustion system for direct venting using either 3" or 4" CPVC vent pipe. Factory assembled and tested. Water heater shall be approved for zero inch clearance to combustibles. A digital LCD display shall be integrated into the front and be an adjustable electronic thermostat to any temperature up to 180°F. A recycling Energy Cut Off (E.C.O.) shuts off all gas in the event of an overheat condition. Certified at 300 PSI test pressure and 150 PSI working pressure. Design certified by CSA International, ANSI standard Z-21.10.3, for up to 180°F application as an Automatic Storage Heater. Neutralizing kit. Bradford White.
- C. Circulating Pump: In-line centrifugal. 3-speed motor. Body: Lead Free bronze body, brass impeller. Mechanical seals. Bronze sleeve bearings, Integral thermal overload protection. Bell and Gossett/Xylem, Taco. -OR- Body: Aluminum housing. All parts exposed to fluid, stainless steel. Water lubricated ceramic shaft and bearings. Epoxy encapsulated windings. Grundfos.

PART 3: - EXECUTION

PIPING INSTALLATION: 3.1

General: A.

1. Piping Layout: Piping shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location to be approved by Architect. No structural member shall be weakened by

cutting, notching, boring or otherwise, unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. All piping shall be installed in a manner to ensure unrestricted flow, eliminate air pockets, prevent any unusual noise, and permit complete drainage of the system. All piping shall be installed to permit expansion and contraction without strain on piping or equipment. Vertical lines shall be installed to allow for building settlement without damage to piping. Pipe sizes indicated on the drawings are nominal sizes unless otherwise noted.

2. Joints:

- Threaded: Pipe shall be cut square and reamed to full size. Threads shall a. be in accordance with ANSI B2.1. Joint compound or tape suitable for conveyed fluid shall be applied to male thread only. Joints shall be made with three threads exposed.
- Welded or Brazed: Filler rod shall be of suitable or the same alloy as pipe. b. Brazing filler metal shall have a minimum melting point of 1100F. Welding or brazing shall be performed by a Certified Welder or Brazer as certified by an organization/institution that uses standards recognized by the American Welding Society (AWS) and meets the requirements of the ASME Boiler and Pressure Vessels Code, Section 9.
- Open Ends: Open ends of piping shall be capped during progress of work c. to preclude foreign matter.
- d. Electrical Equipment: Piping shall not be run over electrical panels, motor control centers or switchboards.

3. Fittings and Valves:

- Standard Fittings: All joints and changes in direction shall be made with a. standard fittings. Close nipples shall not be used.
- Reducers: Pipe size reduction shall be made with bell reducer fittings. b. Bushings shall not be used.
- Unions: A union shall be installed on the leaving side of each valve, at all c. sides of automatic valves, at equipment connections, and elsewhere as necessary for assembly or disassembly of piping.
- Valves: All valves shall be full line size. Provide shut-off valve for each d. building and each equipment connection. Provide shut-off valve at each point of connection to existing piping. At equipment connections, valves shall be full size of upstream piping, except that gas valves within 18" of the point of connection to the equipment may be the same size as the equipment connection.
- Valve Accessibility: All valves shall be located so that they are easily e. accessible. Valves located above ceilings shall be installed within 24" of the ceiling. For situations where this is not practical or where valves are greater than 10' above the floor, chain wheel operators shall be provided. Chain shall extend down to 7' above the floor. All such installations must have prior review by the Engineer.

4. Pipe Support:

General: Hangers shall be placed to support piping without strain on joints or fittings. Maximum spacing between supports shall be as specified below. Actual spacing requirements will depend on structural system. Side beam clamps shall be provided with retaining straps to secure the clamp to the opposite side of the beam. Vertical piping shall be supported with riser clamp at 20' on center (maximum). Support pipe within 12" of all changes

in direction. Support individual pipes with pipe hanger. Copper piping systems which protrude through a surface for connection to a fixture stop or other outlet shall be secured with a drop ell, Nibco 707-3-5, to a Holdrite Model #SB1 bracket; nipple through surface shall be threaded brass.

(1) Pressure Pipe:

	Maximum Spacing* Between Supports (ft.)			
Pipe Size (Inches)				
	Copper	Sch. 40 steel	Plastic	
1/2	6	6	4	
3/4	6	8	4	
1	6	8	4	
1-1/4	6	10	4	
1-1/2	6	10	4	
2	10	10	4	
2-1/2	10	10	4	
3	10	10	4	
4	10	10	4	
6	10	10	4	

^{*}Based on straight lengths of pipe with couplings only. Provide additional supports for equipment, valves or other fittings. Plastic piping shall be supported per the manufacturer's recommendations. Seismic requirements may reduce maximum spacing.

- (2) Gravity Drain Pipe: Piping shall be supported at each length of pipe or fitting, but in no case at greater spacing than indicated above for pressure pipe.
- h. Hot and Cold Water Piping: All hot and cold water piping shall have isolating shield; no portion of this piping shall touch the structure without an isolating shield except at anchor points for fixture rough-in.
- Trapeze: Trapeze hangers of construction channel and pipe clamps may be c. used. Submit design to Engineer for review.

5. Miscellaneous:

- Escutcheons: Provide chrome plated metal escutcheons where piping penetrates walls, ceilings, or floors in finished areas.
- b. Pipe Sleeves: All piping passing through concrete shall be provided with pipe sleeves. Allow 1" annular clearance between sleeve and pipe for piping 3" and smaller, otherwise 2" annular clearance.
- Pipes Passing through Fire Rated Surfaces: Pipes passing through fire c. rated walls, floors, ceilings, partitions, etc. shall have the annular space surrounding the pipe or pipe insulation sealed with fire rated materials in accordance with the requirements of 2019 CBC Section 714.
- Dielectric Couplings: Dielectric couplings shall be installed wherever d. piping of dissimilar metals are joined, except that bronze valves may be installed in ferrous piping without dielectric couplings.
- Thermometer Tap: Provide tee for instrument well. Minimum size of pipe e. surrounding well shall be 1-1/2". Mount on side of pipe.

B. Sanitary Sewer Piping:

- 1. General: Where inverts are not indicated, piping shall be installed at 1/4" per foot pitch. Piping 4" and larger may be installed at 1/8" per foot pitch where structural or other limitations prevent installation at a greater pitch. Bell and spigot piping shall be installed with barrel on sand bed; excavate hole for bell.
- 2. Cleanouts: Install cleanouts at ends of lines, at changes of direction greater than 45 degrees, and at not greater than 100 foot intervals. Locate interior cleanouts in accessible locations and bring flush to finished surface.
- 3. Vents: Vents shall terminate not less than 6" above the roof nor less than 12" from any vertical surface nor within 10' of any outside air intake. Install horizontal vent lines at 1/4" per foot pitch. Offset vents 2' minimum from gutters, parapets, ridges and roof flashing.
- C. Water Piping: Connections to branches and risers shall be made from top of main. Supply header in fixture battery shall be full size to last fixture, reducing in size only on individual connections to each fixture in battery. Minimum pipe size shall be 1/2", unless otherwise noted. Exposed fixture stops and flush valves shall be installed with brass nipples for copper piping and galvanized nipples for galvanized piping. Nipples are to extend from outside of wall to fitting at header or drop behind finish wall surfaces. Pipe nipples shall be same size as stop or flush valve. Provide shut off for each building and each connection to equipment. Shock absorbers shall be installed in a vertical position as indicated on drawings. Only equipment mounted on vibration isolators shall be connected with flexible connections. Underground hot water and cold water piping which run parallel to each other shall be installed a minimum of 3 feet apart. The manufacturer of the pre-insulated underground hot water piping system shall instruct the installer regarding the manufacturer's required installation procedures. The manufacturer shall also provide sufficient job-site inspection to ensure that the work is being accomplished in accordance with the plans, specifications and manufacturer's requirements. Upon completion of the installation, a certificate shall be furnished to the Architect by the manufacturer of the system, certifying the installation was made in accordance with his requirements and in compliance with the plans and specifications.
- D. Gas Piping: Installation shall comply with CPC and NFPA 54 (National Fuel Gas Code). Shall be pitched to drain to drip legs at low points where other than dry gas conditions exist. No unions shall be installed except at connections to equipment. Provide shutoff and dirt leg (sediment trap) at each equipment connection. Only equipment mounted on vibration isolators shall be connected with flexible connectors. Odor Fade Warning - The odorant in propane (LP) and natural gas is colorless and
- the intensity of its odor can fade under some circumstances. Contact the utility company for more information. E. Drain Piping (Including Condensate): Install with constant pitch to receptacle, 1/4" per foot
- where possible, otherwise 1/8" per foot minimum. Provide TEE with clean-out plug at all changes of direction. Provide trap at each air handling unit to prevent air leakage. Only equipment mounted on vibration isolators shall be connected with flexible connection. Piping not concealed in wall structure, above ceilings or below floors shall be chrome plated brass, except in equipment rooms, piping shall be galvanized steel. P&T relief and water heater drain piping shall be galvanized steel. Provide secondary drain piping where required.

F. Plastic Piping: Shall be cut square and assembled prior to solvent weld. Apply primer per manufacturer's recommendations. Coat male joint fully with solvent, make joint before solvent dries and wipe exterior clean.

PIPING INSULATION INSTALLATION: 3.2

A. Domestic Hot Water:

- General: All domestic hot water piping, fittings and accessories shall be insulated. 1.
- 2. Pipe: Apply pre-molded fiberglass sections to pipe using integral pressure sealing lap adhesive in accordance with manufacturer's recommendations. Stagger longitudinal joints. Seal butt joints with factory supplied pressure sealing tape.
- 3. Fittings and Valves:
 - Wrap all fittings and valves with pre-cut fiberglass blanket to thickness matching adjoining insulation. Cover blanket with PVC jacket in accordance with manufacturer's recommendations. Solvent weld. Seal all joints with factory supplied pressure sealing vapor barrier tape with 1-1/2" (min.) overlap on both sides of joint. Insulate valves to stem. Do not insulate unions, flanges or valves unless water temperature exceeds 140F or the piping is exposed to weather.
 - b. For miscellaneous fittings and accessories for which PVC jackets are not available or where proximity of fittings precludes a neat-appearing installation, the Contractor may cover the fiberglass blanket with stretchable glass fabric, one coat of lagging adhesive and a final coat of vapor barrier coating. All exposed ends of insulation shall be adequately sealed.
- 4. Additional Finish for Exposed Piping and Equipment: All piping and equipment exposed to view but protected from the weather shall be given an additional finish of PVC jackets.
- B. Cold Water Piping-Freeze Protection: All cold water piping exposed to weather or other areas subject to freezing (i.e. ventilated attics, uninsulated exterior soffits, etc.) shall be insulated same as hot water piping. Cover with PVC jacketing where exposed to view, aluminum jacketing where exposed to weather.
- C. Piping Insulation Under Accessible Lavatories and Sinks: Water piping, water stops and drain piping under accessible lavatories and sinks shall be insulated with 1/8" thick molded closed cell vinyl. Installation shall be in accordance with manufacturer's instructions.

3.3 FIXTURE INSTALLATION:

- A. Fixture Height: Shall be as indicated on Architectural drawings.
- B. Floor Drains or Floor Sinks: Shall be placed parallel to room surfaces, set level, flush with floor, and adjusted to proper height to drain. Cover openings during construction to keep all foreign matter out of drain line.
- C. Wall Hung Fixtures: Shall be provided with proper backing and hanger plates secured to wall. Fixtures mounted on carriers shall bear against stop nuts, clear of wall surface. Caulk fixtures against walls with white G.E. "Sanitary SCS1700" silicone sealant. Caulking shall be smooth and flush with fixture surface (not concave).

- D. Floor Mounted Fixtures: Shall be provided with proper support plates. Caulk floor mounted fixtures with white G.E. "Sanitary SCS1700" silicone sealant. Caulking shall be smooth and flush with fixture surface (not concave).
- E. Other Connections: Rough-in and connection for trim or fixtures supplied by others shall be included in this specification section.

3.4 **EQUIPMENT INSTALLATION:**

- General: It shall be the responsibility of the equipment installer to insure that no work done A. under other specification sections shall in any way block, or otherwise hinder the equipment. All equipment shall be securely anchored in place.
- B. Connections to Equipment: Where size changes are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

3.5 **TESTS AND ADJUSTMENTS:**

A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Architect. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and entire work retested. Tests may be made in sections, however, all connections between sections previously tested and new section shall be included in the new test.

B. **Gravity Systems:**

- 1. Sanitary Sewer: All ends of the sanitary sewer system shall be capped and lines filled with water to the top of the highest vent, 10' above grade minimum. This test shall be made before any fixtures are installed. Test shall be maintained until all joints have been inspected, but no less than 2 hours.
- 2. Drains (Including Condensate): Similar to Sanitary Sewer.
- Storm Drain: Similar to Sanitary Sewer. 3.

C. Pressure Systems:

- General: There shall be no drop in pressure during test except that due to ambient temperature changes. All components of system not rated for test pressure shall be isolated from system before test is made.
- 2. Domestic Hot and Cold Water Piping: Maintain 100 psig water pressure for 4 hours.
- 3. Gas Piping: Maintain 100 psig air pressure for 4 hours.
- 4. Backflow Preventer: All backflow preventers shall be tested according to manufacturer's recommendations and the USC Cross Connection Control and Hydraulic Research Manual (8th Edition). Testing shall be performed by an AWWA Certified Backflow Prevention Assembly Tester. Contractor shall certify in writing to the Architect the date which backflow preventers were tested and by whom test was witnessed.

3.6 DISINFECTION:

A. Disinfect all domestic water piping in accordance with 2019 CPC Section 609.9, and in accordance with administrative authority. Disinfection process shall be performed in cooperation with health department having jurisdiction and witnessed by a representative of the Architect. During procedure signs shall be posted at each water outlet stating, "Chlorination - Do Not Drink". After disinfection, one set of water samples shall be collected by Contractor for bacteriological analysis in presence of Inspector. If the water fails the bacteriological test, Contractor shall disinfect the piping again and pay for any retesting required, at no additional cost to owner. Bacteriological testing results shall be obtained by Contractor and delivered to the Owner through the Architect before project completion. Contractor shall include copy of Bacteriological Test Results at closeout with operation and maintenance manuals.

END OF SECTION

LEG 21188 **220000 - 13** 8/31/2022 3:49 PM

GENERAL MECHANICAL PROVISIONS

SECTION 23 00 00 - GENERAL MECHANICAL PROVISIONS

PART 1: - GENERAL

1.1 GENERAL CONDITIONS:

A. The preceding General and Special Conditions and Divisions 00 and 01 requirements shall form a part of this Section with the same force and effect as though repeated here. The provisions of this Section shall apply to all of the Sections of Divisions 22 and 23 of these Specifications and shall be considered a part of these sections.

1.2 CODES AND REGULATIONS:

- A. All work and materials shall be in full accordance with current rules and regulations of all applicable codes. Nothing in these Drawings or Specifications is to be construed to permit work not conforming to these codes. Should the Drawings or Specifications call for material or methods of construction of a higher quality or standard than required by these codes, the Drawings and Specifications shall govern. Applicable codes and regulations include, but are not necessarily limited to, the following:
 - 1. California Code of Regulations (CCR):
 - a. Title 8, Industrial Relations
 - b. Title 24, Part 1, Administrative Regulations
 - c. Title 24, Part 6, California Energy Code, 2019 Edition
 - d. Title 24, Part 11, California Green Building Code, 2019 Edition
 - 2. California Building Code CBC 2019
 - 3. California Mechanical Code CMC 2019
 - 4. California Plumbing Code CPC 2019
 - 5. California Fire Code CFC 2019
 - 6. California Electrical Code CEC 2019
 - 7. Air Diffusion Council ADC
 - 8. American Gas Association AGA
 - 9. Air Movement and Control Association AMCA
 - 10. American National Standards Institute ANSI
 - 11. Air Conditioning and Refrigeration Institute ARI
 - 12. American Society of Heating, Refrigerating, and Air Conditioning Engineers ASHRAE
 - 13. American Society of Mechanical Engineers ASME
 - 14. American Society for Testing and Materials ASTM
 - 15. American Water Works Association AWWA
 - 16. Cast Iron Soil Pipe Institute CISPI
 - 17. National Electrical Manufacturers Association NEMA
 - 18. National Fire Protection Association NFPA
 - 19. National Sanitation Foundation NSF
 - 20. Occupational Safety and Health Act OSHA
 - 21. Plumbing and Drainage Institute PDI
 - 22. Sheet Metal and Air Conditioning Contractors National Association SMACNA
 - 23. Underwriters' Laboratory UL

1.3 PERMITS AND FEES:

LEG 21188 **230000 - 1** 8/31/2022 3:49 PM
Revision Date: 08/31/22

GENERAL MECHANICAL **PROVISIONS**

The Contractor shall take out all permits and arrange for all tests in connection with his A. work as required. All charges are to be included in the work. Permits for equipment connected to a particular system are to be considered as part of the work included under each system. All charges or fees for service connections, meters, etc. shall be included in the work.

COORDINATION OF WORK: 1.4

Layout of materials, equipment and systems is generally diagrammatic unless specifically A. dimensioned. Some work may be shown offset for clarity. The actual locations of all materials, piping, ductwork, fixtures, equipment, supports, etc. shall be carefully planned prior to installation of any work in order to avoid all interference with each other, or with structural, electrical, architectural or other elements. Verify the proper voltage and phase of all equipment with the electrical plans. If discrepancies are discovered between drawing and specification requirements, the more stringent requirement shall apply. All conflicts shall be called to the attention of the Architect and the Engineer prior to the installation of any work or the ordering of any equipment. No work shall be prefabricated or installed prior to this coordination. No costs will be allowed to the Contractor for any prefabrication or installation performed prior to this coordination.

B. Mandatory Coordination and Shop Drawings:

- 1. Prepare or have prepared high level detailed Shop Drawings in plan view, with cross-sections as necessary, indicating the proposed installation plan for all HVAC, mechanical, fire sprinkler, and plumbing installations for the project. These Drawings should depict actual elevations and linear dimensions, as well as all routing changes, transitions, major offsets, deck and structural attachments deemed necessary to accomplish the installation. Individual Shop Drawings may be prepared for each trade working within the designated space or area; however, the coordination of the consolidated installation shall remain the responsibility of the Contractor. These Shop Drawings shall be provided to each Subcontractor having Work in each area for coordination. Any fittings, offsets or other changes due to coordination shall be at no additional cost to District.
- 2. Whereas the Drawings are diagrammatic, showing only the general arrangement of the systems, Contractor shall have responsibility for the fitting of materials and equipment to other parts of the equipment and structure, and to make adjustments as necessary or required to resolve space problems, preserve service room, and avoid architectural and structural elements and the Work of other trades. Contractor may be required to identify certain areas to relocate installations within the spaces depicted on the Drawings, e.g., ductwork and/or piping may be shifted within the space shown to accommodate other systems. Such functional relocations shall not be deemed a change to the requirements of the Contract. In the event a major rerouting of a system appears necessary, Contractor shall prepare and submit for approval, Shop Drawings of the proposed rearrangement.
- 3. Because of the diagrammatic nature and small scale of the Drawings, all necessary offsets, adjustments, and transitions required for the complete installation are not shown. Contractor shall carefully investigate the conditions affecting all the Work and shall arrange such Work accordingly, furnishing such fittings, equipment, valves, accessories, offsets, etc., as may be required, regardless of size or cost, to meet such conditions, at no additional cost to the Owner.

LEG 21188 230000 - 2 8/31/2022 3:49 PM

Revision Date: 08/31/22

GENERAL MECHANICAL **PROVISIONS**

- Coordination changes are not design changes and shall be provided at no additional 4. cost to Owner. Any guidance, drawing or clarification issued by the Architect or Engineer to assist the Contractor or their sub-contractors in their coordination during construction are not design changes and shall be provided at no additional cost to Owner.
- 5. Resolve differences or disputes between subcontractors and materials suppliers concerning coordination, interference, or extent of work between sections. The Contractor's decisions, if consistent with the Contract Documents, shall be final. The Architect and their Consultants are not required to coordinate work between sections and will not do so. Any changes required that affect the design intent shall be presented to and approved by the Architect and Engineer of Record.
- The coordinated Shop Drawings must be signed off by HVAC, Plumbing, Fire 6. Sprinkler, Electrical, Framing, Ceiling Installation, and Data and Low Voltage Subcontractors.
- 7. The signed off Shop Drawings shall be submitted to the Owner's Representative for review and approval prior to commencement of installation.
- 8. Provide reviewed Shop Drawings to each Subcontractor having Work in each area.

1.5 **GUARANTEE:**

A. Guarantee shall be in accordance with the General Conditions. These Specifications may extend the period of the guarantee for certain items. Where such extensions are called for, or where items are normally provided with guarantee periods in excess of that called for in the General Conditions, the certificate of guarantee shall be furnished to the Owner through the Architect. Equipment that is started and operated prior to acceptance shall have the guarantee extended to cover that period. Owner guarantee shall start at acceptance.

1.6 **QUIETNESS:**

Piping, ductwork and equipment shall be arranged and supported so that vibration is a A. minimum and is not transmitted to the structure.

1.7 **DAMAGES BY LEAKS:**

The Contractor shall be responsible for damages caused by leaks in the temporary or A. permanent piping systems prior to completion of work and during the period of the guarantee, and for damages caused by disconnected pipes or fittings, and the overflow of equipment prior to completion of the work.

1.8 **EXAMINATION OF SITE:**

The Contractor shall examine the site, compare it with Plans and Specifications, and shall A. have satisfied himself as to the conditions under which the work is to be performed. No allowance shall subsequently be made in his behalf for any extra expense to which he may be put due to failure or neglect on his part to make such an examination.

1.9 COMPATIBILITY WITH EXISTING SYSTEMS:

Any work which is done as an addition, expansion or remodel of an existing system shall A. be compatible with that system.

LEG 21188 230000 - 3 8/31/2022 3:49 PM

GENERAL MECHANICAL PROVISIONS

1.10 MATERIALS AND EQUIPMENT:

A. Materials and equipment shall be new unless otherwise noted. Materials and equipment of a given type shall be by the same manufacturer. Materials and equipment shall be free of dents, scratches, marks, shipping tags and all defacing features at time of project acceptance. Materials and equipment shall be covered or otherwise protected during construction as required to maintain the material and equipment in new factory condition until project acceptance.

1.11 SUBMITTALS:

A. Shop Drawings: Within 30 days of contract award, the Contractor shall submit six copies of shop drawings for all materials, equipment, etc. proposed for use on this project (this includes deferred approval items). Material or equipment shall not be ordered or installed until written review is processed by the Engineer. Any item omitted from the submittal shall be provided as specified without substitution.

All shop drawings must comply with the following:

- Shop drawings are required for all material and equipment items and shall include manufacturer's name and catalog numbers, dimensions, capacities, performance curves, and all other characteristics and accessories as listed in the specifications or on the drawings. Descriptive literature shall be current factory brochures and submittal sheets. Capacities shall be certified by the factory. FAX submittals are not acceptable.
- 2. All shop drawings shall be submitted at one time in a neat and orderly fashion in a suitable binder with title sheet including Project, Engineer and Contractor, table of contents, and indexed tabs dividing each group of materials or item of equipment. All items shall be identified by the specification paragraph number for which they are proposed. All equipment shall also be identified by the mark number as indicated on drawings.
- 3. All capacities, characteristics, and accessories called for in the specifications or on the drawings shall be high-lighted, circled or underlined on the shop drawings. Calculations and other detailed data indicating how the item was selected shall be included for items that are not scheduled. Data must be complete enough to permit detailed comparison of every significant characteristic which is specified, scheduled or detailed.
- 4. Drawings shall be submitted in both hard copy and electronic form, electronic files shall be in their native format (i.e. DWG for AutoCAD, RVT for Revit, etc).
- 5. Electronic Submittals: Where allowed by Division 01, electronic submittals are acceptable providing the following requirements are met. Electronic submittals which do not comply with these requirements will be rejected.
 - a. Submittal shall be a single file in PDF format, with bookmarks for table of contents and each tab, and sub-bookmarks for each item.
 - b. All text shall be searchable (except text that is part of a graphic).
 - c. Submittal shall include all items noted in 1 through 3 above, except a binder is not required.
 - d. Electronic submittals shall be processed through normal channels. Do not submit directly to the Engineer unless the Engineer is the prime consultant for the project.

LEG 21188 **230000 - 4** 8/31/2022 3:49 PM
Revision Date: 08/31/22

GENERAL MECHANICAL PROVISIONS

e. Contractor shall provide Owner and Owner's Representative with hard copies of the final submittal. Coordinate exact number required with Owner through Architect/Engineer.

B. Substitutions:

- 1. Manufacturers and model numbers listed in the specifications or on the drawings establish the size, standard of quality, features and function selected by the Engineer for this Project. Alternate manufacturers may be submitted for review by the Engineer as allowed by Section 01 33 00 "Submittal Procedures" or Section 01 25 00 "Substitution Procedures", as applicable. If the alternate manufacturers are not approved, then the Contractor shall submit product specified. Calculations and other detailed data indicating how the item was selected shall be included.
- 2. Due to the complexity of mechanical equipment, features and functions, where equipment is scheduled on the drawings, any equipment submitted other than scheduled equipment is considered a substitution, and shall comply with the requirements of Section 01 25 00 "Substitution Procedures". It is understood that because of this complexity, subsequent reviews of Substitution Requests may be unavoidable. The Mechanical Engineer waives the fees identified in Section 01 25 00, for the initial and first subsequent review of a Substitution Request for mechanical equipment scheduled on the Drawings.
- 3. The Contractor shall assume full responsibility that substituted items or procedures will meet the specifications and job requirements and shall be responsible for the cost of redesign and modifications to the work caused by these items. At the Engineer's request, furnish locations where equipment similar to the substituted equipment is installed and operating along with the user's phone numbers and contact person. Satisfactory operation and service history will be considered in the acceptance or rejection of the proposed substitution.
- C. Review: Submittals will be reviewed for general conformance with the design concept, but this review does not guarantee quantity shown, nor does it supersede the responsibility of the Contractor to provide all materials, equipment and installation in accordance with the drawings and specifications. The Contractor shall agree that shop drawing submittals processed by the Engineer are not Change Orders; that the purpose of shop drawing submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use. The Contractor shall agree that if deviations, discrepancies or conflicts between shop drawings and design drawings and specifications are discovered either prior to or after shop drawing submittals are processed by the Engineer, the design drawings and specifications shall control and shall be followed. If a resubmittal is required, submit a complete copy of the Engineer's review letter requiring such with the resubmittal.

1.12 MANUFACTURER'S RECOMMENDATIONS:

A. All material, equipment, devices, etc., shall be installed in accordance with the recommendations of the manufacturer of the particular item. The Contractor shall be responsible for all installations contrary to the manufacturer's recommendations. The Contractor shall make all necessary changes and revisions to achieve such compliance.

LEG 21188 **230000 - 5** 8/31/2022 3:49 PM Revision Date: 08/31/22

GENERAL MECHANICAL **PROVISIONS**

Manufacturer's installation instructions shall be delivered to and maintained at the job site through the construction of the project.

1.13 SCHEDULING OF WORK:

All work shall be scheduled subject to the review of the Architect, Engineer and the Owner. A. No work shall interfere with the operation of the existing facilities on or adjacent to the site. The Contractor shall have at all times, as conditions permit, a sufficient force of workmen and quantity of materials to install the work contracted for as rapidly as possible consistent with good work, and shall cause no delay to other Contractors engaged upon this project or to the Owner.

OPENINGS, CUTTING AND PATCHING: 1.14

A. The locations and dimensions for openings through walls, floors, ceilings, foundations, footings, etc. required to accomplish the work under this Specification Division shall be provided under this Division. Except as noted below, the actual openings and the required cutting and patching shall be provided by other Divisions. Coring through existing concrete or masonry walls, floors, ceilings, foundations, footings, etc., and saw cutting of concrete floors or asphaltic concrete required to accomplish the work under this Specification Division shall be provided under this Division. Patching of these surfaces shall be provided by other Divisions. Cutting or coring shall not impair the strength of the structure. Any damage resulting from this work shall be repaired at the Contractor's expense to the satisfaction of the Architect.

1.15 **EXCAVATION AND BACKFILL:**

- General: Barrel of pipe shall have uniform support on sand bed. Sand shall be free from A. clay or organic material, suitable for the purpose intended and shall be of such size that 90 percent to 100 percent will pass a No. 4 sieve and not more than 5 percent will pass a No. 200 sieve. Unless otherwise noted, minimum earth cover above top of pipe or tubing outside building walls shall be 24", not including base and paving in paved areas.
- B. Excavation: Width of trenches at top of pipe shall be minimum of 16", plus the outside diameter of the pipe. Provide all shoring required by site conditions. Where over excavation occurs, provide compacted sand backfill to pipe bottom. Where groundwater is encountered, remove to keep excavation dry, using well points and pumps as required.

C. Backfill:

- 6" Below, Around, and to 12" Above Pipe: Material shall be sand. Place carefully 1. around and on top of pipe, taking care not to disturb piping, consolidate with vibrator. Native soil may be used where allowed by Geotechnical (Soils) Report. Where native soil is used, trenching for gravity drain pipe shall be done using a laser-level and trencher.
- 2. One Foot Above Pipe to Grade: Material shall be sandy or silty loam, free of lumps, laid in 6" layers, uniformly mixed to proper moisture and compacted to required density. If backfill is determined to be suitable and required compaction is demonstrated by laboratory test, water compaction in 6" layers may be used, subject to review by Engineer.

LEG 21188 230000 - 6 8/31/2022 3:49 PM

Revision Date: 08/31/22

GENERAL MECHANICAL **PROVISIONS**

D. Compaction: Compact to density of 95% within building and under walkways, driveways, traffic areas, paved areas, etc. and to 90% elsewhere. Demonstrate proper compaction by testing at top, bottom and one-half of the trench depth. Perform these tests at three locations per 100' of trench.

PROTECTIVE COATING FOR UNDERGROUND PIPING: 1.16

All metal pipe below grade shall have a factory applied protective coating of extruded high A. density polyethylene, 35 to 70 mils total thickness, X-Tru-Coat, Scotchkote. All fittings and areas of damaged coating shall be covered with two layer double wrap of 10 mil polyvinyl tape to total thickness of 40 mils. Johns-Manville. Protective coating shall be extended 6" above surrounding grade.

1.17 **ACCESS DOORS:**

Provide access doors as required where equipment, piping, valves, ductwork, etc. are not A. otherwise accessible. Access doors shall match the wall or ceiling finish and fire rating as indicated on the Architectural drawings. 16-gage steel frame and 14-gage steel door with paintable finish, except in ceramic tile, where door shall be 16-gage stainless steel with satin finish. Continuous hinge. Key and cylinder lock (except quick-opening type for Emergency Gas Shutoff Valve). Deliver doors to the General Contractor for installation. Milcor. Unless otherwise noted, the minimum sizes shall be as follows:

1 valve up to 1-1/2"	12" x 12"
1 valve up to 3"	16" x 16"

1.18 **HOUSEKEEPING PAD:**

A. Housekeeping pads shall be 6" high concrete, 3000 PSI strength, unless otherwise noted. Pad shall extend 6" beyond the largest dimensions of the equipment, unless otherwise noted. The top edge of the pad shall have a 3/4" chamfer. The pad shall have #4 reinforcing bars at 12" on center, each way, located at the mid-depth of the pad. If not poured at the same time as the floor slab with pad rebar tied to floor rebar, the pad shall be anchored as follows: Drill 1" diameter, 4" deep hole in floor. Fill hole with "Por-Rok", then insert 8" long, #4 rebar into hole. Provide a minimum of 4 of these anchors per pad, but no more than 4 feet apart in either direction. Anchor points shall be 12" from the edge of the pad.

1.19 **CONCRETE ANCHORS:**

A. Steel bolt with expansion anchor requiring a drilled hole - powder driven anchors, adhesive anchors and concrete screws are not acceptable. Re-use of screw anchor holes shall not be permitted. Minimum concrete embedment shall be 4-1/2 diameters. Minimum spacing shall be 12 diameters center to center and 6 diameters center to edge of concrete. Post-installed anchors in concrete used for component anchorage shall be pre-qualified for seismic application in accordance with ACI 355.2 and ICC-ES AC193. Post-installed anchors in masonry used for component anchorage shall be pre-qualified for seismic applications in accordance with ICC-ES AC01. Maximum allowable loads for tension and shear shall be as determined by Calculation in compliance with ACI 318-14, Chapter 17, and the anchor's ICC or IAPMO evaluation report. Hilti, Powers, Red Head.

LEG 21188 230000 - 7 8/31/2022 3:49 PM

Revision Date: 08/31/22

GENERAL MECHANICAL PROVISIONS

1.20 EQUIPMENT ANCHORING:

A. All equipment shall be securely anchored in accordance with ASCE 07-16, Chapter 13, as amended by CBC Section 1617A.1. All equipment mounted on concrete shall be secured with a concrete anchor as shown on drawings at each mounting point.

1.21 SEISMIC SUPPORT AND RESTRAINT DESIGN SERVICE:

- A. All mechanical systems (equipment, ductwork, piping, etc.) shall be provided with supports and seismic restraints in accordance with the "Seismic Restraint Components for Suspended Utilities", 2020 Edition, as published by Mason West Inc., OPM-0043-13, or other OSHPD pre-approved system, and in accordance with ASCE 07-16, Chapter 13, as amended by CBC Section 1617A.1. Brace spacing shall be reduced by 50% for cast iron, plastic, no-hub, or other non-ductile piping. A copy of this manual shall be kept on site at all times during construction.
- B. Contractor shall obtain the services of a Seismic Design service to provide engineered seismic supports and restraints for the project. Mason Industries, or pre-approved equal. .

 Note: Use of the "12 inch rule" does not exempt Contractor from this requirement.
 - 1. All seismic designs, including designs using OSHPD pre-approvals, shall be submitted as project specific engineered designs sealed and signed by a licensed California structural engineer. All seismic designs shall include project / application specific seismic design demand calculations. Said seismic design demand calculations shall account for seismic forces in all applicable direction including axial, lateral, vertical tension, vertical compression, etc. Designs shall account for prying, eccentricity, uneven loading, weak axis bending, etc.
 - 2. Seismic restraint layouts for piping, ductwork and electrical raceways shall be furnished on shop drawings or added to the contractor's shop drawings and shall include:
 - a. The number, size and location of seismic braces.
 - b. Maximum support loads and seismic loads at the seismic brace locations.
 - c. Reference to specific details or pages from the OSHPD pre-approved system (OPM).
 - d. If use of the "12 inch rule" is intended by Contractor, design service shall verify locations where it is intended to be used is feasible and specifically identify these locations on the shop drawings, along with appropriate hanger details.
 - 3. Installations not addressed by the OPM approval must be designed, detailed and submitted along with the shop drawings.
 - 4 Submit seismic restraint layout drawings and special details for approval of the project structural engineer per the requirements listed in the OSHPD pre-approval (OPM).
 - 5. Seismic restraint layout drawings shall bear the stamp and signature of the registered professional structural engineer licensed in the state of California who designed the layout of the braces.

1.22 ASBESTOS CONTAINING MATERIALS AND ASBESTOS REMOVAL:

A. No materials or material coatings containing asbestos shall be allowed on this project.

LEG 21188 **230000 - 8** 8/31/2022 3:49 PM Revision Date: 08/31/22

GENERAL MECHANICAL **PROVISIONS**

B. All asbestos removal shall be by Owner. Asbestos is to be removed before the work is started. If the Contractor discovers asbestos which has not been removed, the Contractor shall immediately cease work in that area and promptly notify the Owner.

1.23 SYSTEM IDENTIFICATION:

- Above Grade Piping: Provide markers on piping which is either exposed or concealed in A. accessible spaces. For piping systems, other than drain and vent lines, indicate the fluid conveyed or its abbreviation, either by pre-printed markers or stenciled marking, and include arrows to show direction of flow. Pre-printed markers shall be the type that wrap completely around the pipe, requiring no other means of fastening such as tape, adhesive, etc. Comply with ANSI A13.1 for colors. Locate markers at ends of lines, near major branches and other interruptions including equipment in the line, where lines pass through floors, walls or ceilings or otherwise pass into inaccessible spaces, and at 50' maximum intervals along exposed portions of lines. Marking of short branches and repetitive branches for equipment connections is not required.
- B. Below Grade Piping: Bury a continuous, pre-printed, bright-colored, metallic ribbon marker capable of being located with a metal detector with each underground pipe. Locate directly over buried pipe, 6" to 8" below finished grade.
- C. Equipment: All equipment shall be identified with a plastic laminated, engraved nameplate which bears the unit mark number as indicated on the drawings (e.g. AC-4) and identifies the area or space served by the equipment. Provide 1/2" high lettering - white on black background. Nameplates shall be permanently secured to the exterior of the unit.
- D. Valves: Provide stamped brass valve tags with brass hooks or chains on all valves of each piping system, excluding check valves, valves within equipment, faucets, stops and shut-off valves at fixtures and other repetitive terminal units. Prepare and submit a tagged-valve schedule, listing each valve by tag number, location and piping service. Deliver to Owner through Architect.

1 24 CLEANING:

- Progressively and at completion of the job, the Contractor shall thoroughly clean all of his A. work, removing all debris, stain and marks resulting from his work. This includes but is not limited to building surfaces, piping, equipment and ductwork, inside and out. Surfaces shall be free of dirt, grease, labels, tags, tape, rust, and all foreign material.
- B. At the end of each work day, the Contractor shall cover all open ends of piping and ductwork with protective plastic.

1.25 ACCEPTANCE TESTING:

A. All acceptance testing as required by California Code of Regulations, Title 24, and as noted on the Certificate of Compliance form, (where applicable), shall be performed and documented by an Acceptance Test Technician (ATT). These documents must be provided to the building inspector during construction and must be completed through an Acceptance Test Technician Certification Provider (ATTCP). The Contractor shall submit a copy of the

LEG 21188 230000 - 9 8/31/2022 3:49 PM

Revision Date: 08/31/22

GENERAL MECHANICAL **PROVISIONS**

documentation to the Engineer for review (hardcopy or electronic), prior to submitting to Administrative Authority.

1.26 OPERATION AND MAINTENANCE INSTRUCTIONS:

- Printed: Three copies of Operation and Maintenance Instructions and Wiring Diagrams for A. all equipment and parts list for all faucets, trim, valves, etc. shall be submitted to the Engineer. All instructions shall be clearly identified by marking them with the same designation as the equipment item to which they apply (e.g. AC-3). All Wiring Diagrams shall agree with reviewed Shop Drawings and indicate the exact field installation. All instructions shall be submitted at the same time and shall be bound in a suitable binder with tabs dividing each type of equipment (e.g. Pumps, Fans, Motors, etc.). Each binder shall be labeled indicating "Operating and Maintenance Instructions, Project Title, Contractor, Date" and shall have a Table of Contents listing all items included. Electronic O & M's shall comply with the Electronic submittal requirements in this Section.
- B. Verbal: The Contractor shall verbally instruct the Owner's maintenance staff in the operation and maintenance of all equipment and systems. The controls contractor shall present that portion of the instructions that apply to the control system. The Engineer's office shall be notified 48 hours prior to this meeting.

1.27 **RECORD DRAWINGS:**

A. The Contractor shall obtain one set of blue line prints for the project, upon which a record of all construction changes shall be made. As the work progresses, the Contractor shall maintain a record of all deviations in the work from that indicated on the drawings. Final location of all underground work shall be recorded by depth from finished grade and by offset distance from permanent surface structures, i.e. building, curbs, walks. In addition, the water, gas, sewer, underfloor duct, etc. within the building shall be recorded by offset distances from building walls. As part of the Contractor's overhead expense, request a full set of reproducible drawings to transfer the changes, notations, etc. from the marked-up prints to the reproducible drawings. The record drawings (marked-up prints and reproducibles) shall be submitted to the Engineer for review.

PART 2: - PRODUCTS (not used)

PART 3: - EXECUTION (not used)

END OF SECTION

LEG 21188 230000 - 10 8/31/2022 3:49 PM

Revision Date: 08/31/22

HEATING, VENTILATING AND AIR CONDITIONING

SECTION 23 00 01 - HEATING, VENTILATING AND AIR CONDITIONING

PART 1: - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS:

A. The General Mechanical Provisions, Section 23 00 00, shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

- A. Included: Provide all labor, materials and services necessary for complete, lawful and operating systems as shown or noted on the drawings or as specified here. The work includes, but is not necessarily limited to, the following:
 - 1. Air distribution system.
 - 2. All equipment as shown or noted on the drawings or as specified. Furnish motor starters except where motor control centers are used. Coordinate with Division 26.
 - 3. System energy balance.
 - 4. Coordinate with Section 23 09 23 (Direct Digital Control and Energy Management System) regarding location and installation of system sensors and to provide simultaneous start-up.
 - 5. Refrigeration system.

B. Work Specified Elsewhere:

- 1. Line voltage power wiring, motor starters in motor control centers, disconnect switches and installation of all starters are included in the Electrical Section, unless otherwise noted.
- 2. Connection of gas and condensate drains to equipment.
- 3. Concrete and reinforcing steel unless specifically called for in the drawings or specifications.
- 4. Painting unless specifically called for in the drawings or specifications.
- 5. Carpentry.
- 6. Direct Digital Control and Energy Management System (DDC/EMS).

PART 2: - PRODUCTS

2.1 DUCTWORK MATERIALS:

- A. General: All ductwork materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50. Shall comply with 2019 CMC.
- B. Metal Ductwork: Metal ductwork shall be galvanized sheet steel, lock forming quality, ASTM A-653, with gage and construction to match SMACNA Standard for pressure required (26 gage minimum).
 - 1. Grease Bearing Exhaust Ductwork: Exhaust ducts from Type I grease hoods shall be constructed in accordance with Chapter 5 of the California Mechanical Code with 16 gage galvanized steel or 18 gage stainless steel. All joints shall be made with a continuous weld. Grease duct exposed to view shall be stainless steel.

LEG 21188 230001 - 1 Printed: 1/16/2023 2:58 PM Revision Date: 08/31/22

- C. Flexible Ductwork: Insulated flexible ductwork. One pound per cubic foot glass fiber insulation, 1-1/2" thick (R-6), 2" thick (R-8) where ductwork is outside the building thermal insulation envelope. Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft2-°F at a mean temperature of 75°F. Seamless metalized reinforced polyester vapor barrier jacket. Continuous internal liner bonded to galvanized steel wire helix. Duct shall be capable of continuous operation at 1-1/2" of positive water static pressure and 4,000 ft/min air velocity. Duct shall comply with NFPA 90A. JP Lamborn.
- D. Duct Sealants: All Joints Exposed to Weather: Sealant shall be G.E. "Silglaze II" or Silimax Multipurpose Silicone Sealant, without substitution. Joints Not Exposed to Weather: Fiber reinforced. White in color. Design Polymerics DP1030, Hardcast Versa-Grip 181, Hardcast CCWI-181. Joints Not Exposed to Weather and Exposed to View in Finished Areas: Non fibrated. Gray in color. Foster 32-19, Childers CP-146, Design Polymerics DP 1010, or United Duct Sealer WB.

2.2 AIR TERMINALS AND DUCT FITTINGS:

- A. Grilles: (Grilles, Registers, Diffusers and Louvers)
 - Information on Drawings: Refer to Grille Schedule on the drawings for the list of grilles. Manufacturer's model numbers are listed to complete the description Titus. Equivalent models of Anemostat or Krueger are acceptable. Refer to the floor plans for neck size, CFM, air diffusion pattern and fire damper, if required.
 - 2. Performance: Submit complete performance data (throw, pressure drop, noise level, etc.) for all grilles proposed, other than those scheduled. Testing shall be in accordance with ANSI/ASHRAE 70-1991. If, according to the certified data of the manufacturer of the proposed units, the sizes indicated on the drawings will not perform satisfactorily, the units shall be reselected by the Contractor for the proper diffusion, spread, pressure drop, throw and noise level.
 - 3. Frame and Accessories: All supply, return, and exhaust grilles shall not have an opposed blade volume control damper unless otherwise noted. All surface mounted grilles shall have a perimeter gasket and flanged edge. All grilles shall have frames suitable for mounting in the surfaces designated by the architectural drawings. Key or screwdriver operated, no slide bars.
 - 4. Finish: All ceiling and wall grilles and all louvers shall have a paintable white finish unless otherwise noted. Interior components (everything behind the face plate) shall be flat black. Floor grilles shall have an anodized aluminum finish unless otherwise noted.
- B. Branch Duct Volume Damper: Volume control damper (VCD) in rectangular ducts shall be as follows: Opposed blade, 6" maximum blade width, 16-gage blade, 48" maximum length, nylon or oil impregnated bronze bearings, 1/2" diameter pin shaft, 16-gage channel frame, actuating rod and linkage out of air stream. VCD in round duct shall be as follows: Damper blade full height of branch and 1" less than branch width. All branch dampers shall have regulator with stamped steel handle, spring loaded shaft nut, cast body and serrated self-locking die cast core. Regulator for horizontal ducts overhead shall be mounted on sides or bottom of ducts. Secure a 12" length of brightly colored plastic ribbon to handle for ease of location. Where rectangular or round ductwork is insulated, slit insulation to allow handle to protrude. Ventlok 641 (with 607 end bearing for round ducts).

LEG 21188 230001 - 2 Printed: 1/16/2023 2:58 PM Revision Date: 08/31/22

HEATING, VENTILATING AND AIR CONDITIONING

- C. Extractor: Curved blade turns in adjustable position rigid frame. Tuttle and Bailey Deflectrol.
- D. Turning Vanes: Double wall, hollow metal, air foil shape. Spacing in accordance with manufacturer's recommendations. Aero Dyne HEP.

2.3 DUCTWORK INSULATION MATERIALS:

- A. General: All ductwork insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.
- B. Fiberglass Blanket: **Installed** thermal resistance at a mean temperature of 75°F shall meet or exceed indicated value. 3/4 lb/ft3 or 1 lb/ft3, **R-6** where ductwork is within the building thermal insulation envelope. 3/4 lb/ft3 **R-8** where ductwork is outside the building thermal insulation envelope and/or above the roof. Faced with glass reinforced foil laminated to Kraft paper. Certainteed, Knauf, Johns-Manville, Owens-Corning.
- C. Acoustic Lining: Glass fiber duct liner. **Installed** thermal resistance at a mean temperature of 75°F shall meet or exceed indicated value. One side coated with anti-microbial coating to prevent mold growth and fiber erosion up to 6000 ft/min. Average noise reduction coefficient of 0.80. 1.5 lb/ft³ density. 1" thick (**R-4.2**) where ductwork is within the building thermal insulation envelope. 2" thick (**R-8**) where ductwork is outside the building thermal insulation envelope and/or above the roof. Certainteed, Knauf, Johns-Manville, Owens-Corning.
- D. Bonding Adhesive: Design Polymerics DP2501, Foster 85-60.
- E. Fire Resistive Duct Wrap: Nominal 1-1/2" thick, 6 lb/ft3 high-temperature fiber blanket thermal insulation encapsulated in a fiberglass-reinforced aluminized polyester foil. Grease Duct Listing Standards (Double Wrap) ASTM E 2336 / ICC-ES AC101. Ventilation Duct Listing Standard (Single Wrap) ISO 6944. 3M Fire Barrier Duct Wrap 615+.

2.4 EQUIPMENT:

- A. General Requirements:
 - 1. Capacity: Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
 - 2. Dimensions: Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Where Architectural screening is indicated, equipment shall not extend above or beyond screening. Equipment will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.
 - 3. Ratings:
 - a. Gas: Gas burning equipment shall be furnished with 100% safety gas shut-off, intermittent pilot ignition, and be CSA (US) certified, except that boilers shall be CSA (US) certified or UL listed.

LEG 21188 230001 - 3 Printed: 1/16/2023 2:58 PM Revision Date: 08/31/22

HEATING, VENTILATING AND AIR CONDITIONING

- b. Electrical: Electrical equipment shall be in accordance with NEMA Standards and UL or ETL listed where applicable standards have been established.
- 4. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided.
- 5. Electrical:
 - a. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories and controls required by equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Manual and magnetic starters shall have ambient compensating running overcurrent protection in all ungrounded conductors. Magnetic starters shall be manual reset, shall have H-O-A switches and auxiliary contacts. Controllers and other devices shall be in NEMA 1 or 3R enclosures as applicable.
 - b. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts and other devices shall be in ungrounded conductors.
 - c. Motors: Shall be rated, constructed and applied in accordance with NEMA and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Three-phase motors shall be open drip proof, NEMA B design on pumps and fans, NEMA C on reciprocating equipment, sealed ball bearing, three-phase induction unless otherwise noted. Design shall limit starting inrush current and running current to values shown on drawings. Motors 1 horsepower and larger shall be the premium efficiency type, tested according to IEEE Standard 112, Method B. Motors exposed to weather shall be TEFC. Motors in a fan air stream shall be TEFC or TEAO. Vertical motors outdoors shall be ODP or TEFC and shall have rain caps.
 - d. Starters: Motor starters shall be furnished for all equipment except where starter is in a motor control center as designated on the electrical drawings. Deliver starter to Electrical Contractor for installation and wiring.
 - e. Control Voltage: Equipment connected to greater than 240 volts shall be provided with 120 volt control circuit from integral protected transformer if separate source is not indicated on plans. 240 volt control is acceptable if confined within control panel.
 - f. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommended external wiring.
- 6. Fan Selection Static Pressure: Unless otherwise noted, pressure scheduled as external static pressure (ESP) includes all ductwork and accessory losses external to the unit housing. Unless otherwise noted, pressure scheduled as total static pressure includes all ductwork, filter, coil, cabinet, damper and other accessory losses. Unless otherwise noted, pressure scheduled as duct static pressure includes all supply and return ductwork and accessory losses external to the unit housing and plenum (as applicable). The allowance for filter losses is 0.3" WC, unless otherwise noted. Submit itemized static pressure losses for all components.
- 7. Filters:

LEG 21188 230001 - 4 Printed: 1/16/2023 2:58 PM Revision Date: 08/31/22

- a. General: Tested and rated in accordance with ASHRAE Standard 52.2 and Title 24, C.C.R. Furnish and install one complete change of all filters after air balance is completed and prior to acceptance.
- b. Filter Media: 2" media. MERV-13. Clean filter resistance 0.41" water at 500 fpm. Throw-away frame. Class 2. Camfil AP-Thirteen..
- 8. Screens: All duct or louver openings to the outside shall be covered with 1/2", 16-gage, galvanized wire mesh screen.
- 9. Mixing Dampers: Opposed blade, 16-gage. Six-inch maximum blade width, 48" maximum length. Nylon or oil impregnated bronze bearings. One-half inch diameter pin shaft. 16-gage channel frame. One percent maximum leakage at 4" WC in accordance with AMCA 500 for outside air dampers. Actuating rod out of air stream. Arrow.
- 10. Sound Ratings: Shall be in accordance with ASHRAE 36 72. Sound ratings shall not exceed scheduled values.
- 11. Drives: Unless noted as direct connected, drives shall be V-belt, rated at 150% of motor horsepower. Multiple drive belts shall be matched set. Drive sheaves shall be dynamically balanced, adjustable, range +/- 10%, selected at mid range. Adjustable relative movement shall be lockable to shaft. Belts shall be aligned within 1-1/2 degrees at all times. Open drives shall be provided with OSHA approved open mesh belt guards. Belt guards exposed to weather shall be weatherproof enclosure with louvered face for adequate ventilation. Driving motor shall be mounted on adjustable rails. T.B. Woods, Browning. Submit RPM range of driven machine with drive selection.

B. Air Conditioning Unit:

- 1. General: Self-contained heating/cooling unit designed for outdoor installation. Factory assembled and tested. Refer to Paragraph 2.6A for general requirements. Provide all starters and relays required for operation. 24-volt control circuit from integral transformer. Weatherproof cabinet, galvanized steel with enamel finish. Outside air inlet. Drain pan. Multivane centrifugal supply fan. ARI certified. Gas equipment AGA certified. Daikin.
- 2. Refrigeration: Sealed hermetic compressor with internal vibration isolating mount. Crankcase heater, high/low pressure switch, recycling timer. Air-cooled condenser with propeller fan. Non-ferrous finned coil. Low ambient control to 45°F. Single phase units shall have compressor start assist kit. 5-year extended warranty on compressor(s).
- 3. Heat: Natural gas fired. Low NOx. Aluminized or ceramic coated welded steel heat exchanger. Electric ignition. Automatic gas valve. Fan and limit controls.

C. Exhaust Fans:

- General: All exhaust fans shall be tested according to AMCA Standard 210 in an AMCA registered laboratory. Fans exposed to weather shall have ventilated weatherproof housing over motor and drive assembly. Refer to Paragraph 2.6A for general requirements. All direct drive fans shall be provided with unit mounted speed controllers, unless otherwise noted. All motors 1 horsepower and larger shall be the premium efficiency type.
- Ceiling Fan: Direct driven, centrifugal exhaust fan. Fan wheel housing and integral
 outlet duct shall be galvanized steel or injection molded from a specially
 engineered resin exceeding UL requirements for smoke and heat generation. Outlet
 duct shall have an aluminum backdraft damper with continuous aluminum hinge

LEG 21188 230001 - 5 Printed: 1/16/2023 2:58 PM Revision Date: 08/31/22

rod. Inlet box shall be minimum 22 gauge galvanized steel. Motor shall be isolation mounted to a one piece galvanized stamped steel integral motor mount/inlet. Provide a field wiring compartment with disconnect receptacle. Provide an adjustable prepunched mounting bracket to accommodate different ceiling thickness. Provide a powder painted white aluminum egg-crate grille. Unit shall be designed with provision for field conversion from ceiling to in-line. Wheel shall be centrifugal forward curved type, galvanized steel or injection molded of polypropylene resin. Motor shall be open drip proof type with permanently lubricated sealed bearings and include impedance or thermal overload protection and disconnect plug. Greenheck.

Kitchen Hood Fan: Spun aluminum, roof mounted, direct driven, upblast 3. centrifugal exhaust ventilator. Fan shall be UL 762 listed. Fan shall be of bolted and welded construction utilizing corrosion resistant fasteners and stainless steel fasteners on cap. Spun aluminum structural components shall be constructed of minimum 16 gauge marine alloy aluminum, bolted to a rigid aluminum support structure. Aluminum base shall have a one piece inlet spinning and continuously welded curb cap corners for maximum leak protection. Windband shall have a rolled bead for added strength. A two piece top cap shall have stainless steel quick release latches to provide access into the motor compartment without the use of tools. An integral conduit chase shall be provided into the motor compartment to facilitate wiring connections. The motor shall be enclosed in a weather-tight compartment, separated from the exhaust airstream. Unit shall bear an engraved aluminum nameplate. Wheel shall be centrifugal backward inclined, constructed of 100 percent aluminum, including a precision machined cast aluminum hub. An aerodynamic aluminum inlet cone shall be provided for maximum performance and efficiency. Motor shall be heavy duty type with permanently lubricated sealed ball bearings and furnished at the specified voltage, phase and enclosure. Exhaust fan shall have roof curb and hinged base with lock hasp and galvanized aircraft cable supports. Weep hole. Grease trough. Greenheck.

PART 3: - EXECUTION

3.1 DUCTWORK INSTALLATION:

A. General:

- Standards: Unless otherwise noted, all ductwork shall be constructed and installed
 in accordance with current SMACNA Standards. Ductwork shall be built to a
 pressure classification equal to or greater than the maximum operating pressure at
 that point in the ductwork. A copy of these standards shall be maintained at the job
 site at all times. Duct work and accessories shall be installed in a manner to prevent
 vibration and rattling.
- Access: Provide duct access doors as required to adjust equipment and dampers.
 Provide wall or ceiling access panels, or remote actuators as required where
 equipment and dampers are not otherwise accessible. Remote regulator shall be as
 detailed on drawings.
- 3. Flanges and Escutcheon: Where ductwork penetrates walls, ceilings, or floors, furnish and install flange or escutcheon of same material as duct.
- B. Low Velocity-Low Pressure (up to 2,000 ft/min and up to 2.0 in water):
 - 1. Sheet Metal Ductwork:

LEG 21188 230001 - 6 Printed: 1/16/2023 2:58 PM
Revision Date: 08/31/22

- a. Ells: Ells with less than standard radius and square ells shall be fitted with turning vanes.
- b. Tees: Tees in supply ductwork shall be straight tap-in with extractor or 45 degree take-off as shown on drawings. Grilles or branches in supply ductwork shall be a minimum of 8 duct diameters downstream of tees.
- c. Duct Joints and Seams: All joints and seams which are not exposed to weather shall be sealed airtight with duct sealant. All joints and seams exposed to weather shall be sealed air and water tight with silicone sealant. (See Part 2 of this Specification). All joints on metal ductwork not exposed to weather but exposed to view shall be sealed air tight with grey duct sealant.
- d. Dampers: Install volume control damper and damper regulator in all branch ducts.
- 2. Flexible Glass Fiber Ductwork: The use of flexible duct is limited to the last 5 feet of each branch duct (i.e. one 5 foot section of flexible duct may be used to connect the grille to the sheet metal branch duct). No joints are permitted in this 5' length. Hangers shall be 4" wide metal straps spaced to prevent sagging, 42" spacing maximum. Insert 6" wide fiberglass pad between duct and hanging strap. Joints shall be installed with stainless steel or nylon draw bands, Duro Dyne Dyn-O-Tie. Minimum turn radius shall be in accordance with SMACNA Standards (turn radius of duct centerline not less than 1.5 times the duct diameter).
- 3. Grease Bearing Exhaust Ductwork: Horizontal portions of the duct shall slope down towards the hood at 1/4" per foot (min.) unless the total horizontal length exceeds 75 feet, then the slope shall be 1" per foot (min.). Provide access panels at changes of direction as required by CMC. Drains shall be provided at low points in horizontal ducts per 2019 CMC 510.1.3. Horizontal ducts shall be provided with access in accordance with 2019 CMC Section 510.3.3.

3.2 AIR TERMINALS AND DUCT FITTINGS INSTALLATION:

A. General: Unless otherwise noted, all air terminals and duct fittings shall be installed in accordance with current SMACNA Standards. Terminals and fittings shall be installed in a manner to prevent vibration and rattling. Metal surfaces exposed to view behind grilles and registers shall be painted flat black.

3.3 DUCTWORK INSULATION INSTALLATION:

- A. General: Insulate all sheet metal supply, return and outside air intake ductwork except as noted below. Insulation shall be continuous through walls and floors except at fire dampers.
- B. Where Insulation Is Not Required: Do not insulate factory-insulated ducts or casings, acoustic lined ducts, fibrous glass ducts, underground ductwork, supply or return ductwork exposed to view in the space that it serves, or exhaust ductwork.
- C. Concealed Ductwork: Wrap concealed ductwork including outside air intakes with fiberglass blanket lapped 2" minimum. Secure with staples 4" on centers maximum on straight runs and 3" maximum at elbows and fittings. Insulation on bottom of ducts wider than 36" shall also be secured with mechanical fasteners at 24" on center.

LEG 21188 230001 - 7 Printed: 1/16/2023 2:58 PM Revision Date: 08/31/22

- D. Acoustic Lining: Unless otherwise indicated, all supply and return ductwork in equipment rooms, all ductwork exposed to weather and other ducts as indicated on drawings, shall have acoustic lining. Do not acoustic line outside air intakes. Where acoustic lining is installed, increase each sheet metal dimension to accommodate lining and maintain clear inside duct dimensions shown on drawings. Apply lining with bonding adhesive in accordance with manufacturer's recommendations and also secure with mechanical fasteners in accordance with SMACNA Standards. Seal exposed edges of lining with bonding adhesive.
- E. Fire Resistive Wrapped Ducts: Where indicated on drawings, ductwork shall be covered with fire resistive duct wrap. Install in accordance with it's UL or Omega Point Laboratories Design number (as applicable) and the Manufacturer's Installation Instructions.

3.4 EQUIPMENT INSTALLATION:

- A. General: It shall be the responsibility of the equipment installer to ensure that no work done under other specification sections shall in any way block or otherwise hinder the equipment. All equipment shall be securely anchored in place. All equipment shall be installed level.
- B. Connections to Equipment: Where size changes are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

3.5 TESTS AND ADJUSTMENTS:

A. General: Unless otherwise directed, tests shall be witnessed by a representative of the Architect. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test and repair all work to original conditions. Leaks and defects shown by tests shall be repaired and entire work retested.

3.6 SYSTEM ENERGY BALANCE:

- A. Scope: Provide the services of an independent test and balance agency to test, adjust and balance, retest and record performance of the system to obtain design quantities as specified. The agency must prove that they have no affiliation with any equipment manufacturer, design engineer, installing contractor, or any other party which might lead to a conflict of interest, in order to provide an unbiased, third party system balance and report.
- B. Qualifications: Prior to commencing work, the agency shall be reviewed by the Engineer and shall be certified by the Associated Air Balance Council, National Environmental Balancing Bureau or Testing, Adjusting and Balancing Bureau. The agency shall provide documentation of having successfully completed at least five projects of similar size and scope.
- C. Instruments: All instruments shall be accurately calibrated; calibration histories shall be available for examination. Application of instrumentation shall be in accordance with AABC, NEBB or TABB standards.

LEG 21188 230001 - 8 Printed: 1/16/2023 2:58 PM Revision Date: 08/31/22

- D. Submittals: Include in shop drawings copies of forms to be used for testing and balancing showing all data which is to be recorded. Three copies of completed balance report shall be submitted to and reviewed by the Mechanical Engineer prior to the final mechanical construction review.
- E. Procedure General: Procedure shall be in accordance with Associated Air Balance Council's "National Standards for Field Measurements and Instrumentation Total System Balance", Volume Two, No. 12173, or equivalent NEBB or TABB standards. System shall be in full, continuous operation during test. Balanced quantities shall be plus 10%, minus 0% of design quantities. All nameplate data, manufacturer, model and serial numbers shall be recorded for each item tested.
- F. Extended Warranty: The test and balance agency shall include an extended warranty of 90 days after completion of test and balance work, during which time the Engineer, at his discretion, may request a recheck or resetting of any item or items in test report. The agency shall provide technicians to assist the Engineer in making any tests he may require during this period of time.
- G. Air Balance Procedure (For Each Air Handling System):
 - 1. All air filters shall be clean when air balance is performed.
 - 2. Provide a sketch of the equipment showing exactly where all pressure readings were taken.
 - 3. Adjust blower RPM to design requirements.
 - 4. Record motor full load amperes.
 - 5. Make pitot tube traverse of main supply and return ducts and obtain design CFM at fans.
 - 6. Record system static pressures, inlet and discharge.
 - 7. Record filter quantity, size(s) and pressure drop across filter(s) at each filter bank.
 - 8. Adjust system for design CFM recirculated air.
 - 9. Adjust system for design CFM outside air.
 - 10. Record entering air temperatures. (DB heating, DB and WB cooling.)
 - 11. Record leaving air temperatures. (DB heating, DB and WB cooling.)
 - 12. Adjust all main supply and return air ducts to design CFM.
 - 13. Adjust all zones to design CFM, supply and return.
 - 14. Adjust all diffusers, grilles and registers to plus 10%, minus 0% of design requirements.
 - 15. Adjust CFM at all exhaust fans, make-up units, etc. (high and low speed, where applicable). Record applicable data from items 1 through 11 above.
 - 16. Each grille, diffuser and register shall be identified as to location.
 - 17. Verify proper diffusion pattern for all ceiling grilles and that all sidewall grilles are set for 5 degrees upward deflection unless otherwise noted. Make a notation of any that are not set properly.
 - 18. Size, type and manufacturer of diffusers, grilles, registers and all tested items shall be identified and listed. Manufacturer's ratings shall be used to make required calculations on all items.
 - 19. Readings and tests of diffusers, grilles, and registers shall include required FPM velocity and test resultant velocity, required CFM and test resultant CFM after adjustments.

LEG 21188 230001 - 9 Printed: 1/16/2023 2:58 PM Revision Date: 08/31/22

- 20. In cooperation with the control manufacturer's representative, set adjustments of automatically operated dampers to operate as specified. Testing agency shall check all controls for proper calibrations and list all controls requiring adjustment by control installers.
- 21. All diffusers, grilles and registers shall be adjusted for required air patterns and to minimize drafts.
- 22. As a part of the work of this contract, THE AIR CONDITIONING CONTRACTOR shall make any changes in pulleys, belts and dampers or the addition of dampers required for correct balance as recommended by air balance agency, at no additional cost to Owner.
- 23. Set, test and adjust packaged heating/cooling unit economizer operation in cooperation with controls contractor. Record minimum and maximum outside and exhaust airflows.

END OF SECTION

LEG 21188 230001 - 10 Printed: 1/16/2023 2:58 PM Revision Date: 08/31/22

SECTION 23 09 23 - DIRECT DIGITAL CONTROL AND ENERGY MANAGEMENT SYSTEM

PART 1 - GENERAL

1.1 GENERAL MECHANICAL PROVISIONS:

A. The General Mechanical Provisions of Section 23 00 00 shall form a part of this Section with the same force and effect as though repeated here.

1.2 SCOPE:

A. General: The direct digital control and energy management system (DDC/EMS) includes control panels, control devices, valves, actuators, all line and low voltage control and interlock wiring (including wiring to controllers, switches, timers, relays, etc.) and conduit and related equipment, as required for proper operation of all equipment. Provide all equipment, programming, labor, materials and services necessary for a complete, lawful and operating DDC/EMS as shown or noted on the drawings and as specified herein. All control wiring, line and low voltage shall be installed in conduit. Power wiring, power to DDC/EMS control panels and disconnect switches are included in the Electrical Specifications, except that power wiring for control devices such as controllers, valves, etc., is included in the control system. Electrical work shall be in accordance with Electrical Specifications. Set, test and adjust the system for proper operation. The controls system shall be direct digital control/electric. Johnson Metasys, without substitution, to match existing. Except as otherwise noted, the control system shall consist of all Ethernet Network Controllers. The system shall be BACnet protocol and shall be compatible with existing district-wide system. The system shall communicate over the District's Ethernet LAN/WAN, and shall include the latest upgrading (software and firmware) during the warranty period. All existing network controllers on District School sites shall have their software upgraded to the same revision as that installed at this site. The data wiring shall have an Ethernet connection at the DDC/EMS panel and at the onsite workstation.

If the District's current Graphical User Interface is server based, the GUI must be integrated into the District's current GUI server. The design of the total installed system shall be based on such systems, which are the District standards. Coordinate with Section 23 00 01, Heating, Ventilating and Air Conditioning and with Division 26.

B. Contractor Qualifications: All controls shall be furnished and installed by a Contractor who is licensed, certified or contracted by the controls and VRV manufacturers for design, installation, start-up and service of their product. The Contractor must have factory supplied training and support. The Contractor must have sufficient personnel to respond to a trouble call at the site within four hours. The Contractor's local manager shall have a minimum of five years' experience in the design, installation, start-up and service of similar systems. The Contractor shall submit a list of at least five projects which are similar in size, scope and contract value to this project. This list shall include the Owner's contact person, phone number and controls contract value.

LEG 21188 230923 - 1 Printed: 8/31/2022 3:48 PM Revision Date: 08/31/22

- C. Submittals: Within 60 days of contract award, submit eight (8) copies of shop drawings showing the following aspects of the DDC/EMS system (CAD file with DXF format if required of floor and site plans can be secured from the Architect).
 - 1. All termination points, terminal cabinets, and cabling.
 - 2. Schedule of input and output points.
 - 3. Locations of all visible DDC/EMS system components (i.e. interior and exterior sensors, terminal strips, panels, trench and pull boxes, etc.), identifying specifically any exposed conduit.
 - 4. Complete written sequence of operation.
 - 5. Descriptive literature for all material and equipment items shall include manufacturer's name and catalog numbers, dimensions, capacities, and all other characteristics and accessories as listed in the specifications or on the drawings.
 - 6. Submit copies of forms to be used for testing and verification showing all data which is to be recorded. Three copies of complete report shall be submitted for review.
- D. Utility Interfacing: Coordinate interface, via equipment modem and District Ethernet connections furnished by Supplier to Owner's dedicated telephone line or Ethernet network. The DDC/EMS Contractor shall interface with the PG&E electric meter to allow DDC/EMS monitoring and logging of electricity usage, and pay any costs to the utility for such as to comply with PG&E installation requirements.
- E. Installation and Operation Manuals: Furnish Installation and Operating Manuals for all components. These manuals shall contain full documentation which shall include, without being limited to, the following:
 - 1. General description and specifications.
 - 2. Installation and initial checkout procedures.
 - 3. Principles and theory of operation.
 - 4. Complete trouble-shooting procedures and diagrams.
 - 5. Complete alignment and calibration procedures for all components.
 - 6. Program source file on CD or 3-1/2" disk (ASCII text file) and hard copy.
 - 7. Detailed schematics and assembly drawings.
 - 8. Complete recommended spare parts lists including unit prices.

1.03 SYSTEM ARCHITECTURE

- A. DDC/EMS Equipment: The main controller shall contain the network communications and information management programs providing integrated global control, trend logging, local and remote alarming and fully menu driven user interface. It may be equipped with at least 64 local controllers on each network. The local controller is an intelligent, stand-alone microprocessor based controller which can have a variety of configurations based on their application.
- B. Campus-Wide Data Transfer System: The DDC/EMS shop drawings shall indicate where all equipment items are to be located for input and output to complete the system. The conduit/cabling system shall inter-tie these points as required to complete one system to meet the design criteria herein. System high speed communication (LAN) shall be hardwired using a Belden shielded cable as recommended by DDC manufacturer and shall communicate at 10M baud with peer to peer communication. System

LEG 21188 230923 - 2 Printed: 8/31/2022 3:48 PM Revision Date: 08/31/22

communication between master controller and local controllers (field bus) shall be at 19.2K baud minimum with a two wire shielded RS-485 cable. See Drawings for exterior lighting circuits to be controlled by contactors at panels.

- C. User Interface Communication: The user may communicate with the DDC/EMS system with a workstation located at the District Office over the WAN, with a remote workstation via a telephone modem, with an On-Campus Operator Workstation, and with a Lap-Top computer (Service Tool). The system shall be configured to allow the Service Tool to access data and program any controller on the system from any room sensor service port. Alternatively, a conveniently located service port shall be provided in each building that allows access to data and programming of any controller on the system, if the room sensor service port is limited to only the controller to which the sensor is connected.
- D. Standard Network Support: All Master Controllers, Workstation(s) and File Server shall be capable of residing directly on the owner's Ethernet TCP/IP LAN/WAN. Furthermore, the Master Controllers, Workstation(s) and File Server shall be capable of using standard, commercially available, off-the-shelf Ethernet infrastructure components such as routers, switches and hubs. With this design the owner may utilize the investment of an existing or new enterprise network or structured cabling system. This also allows the option of the maintenance of the LAN/WAN to be performed by the owner's Information Systems Department as all devices utilize standard TCP/IP components.

PART 2 - PRODUCTS

2.1 GENERAL:

A. The Electronic Microprocessor Based Direct Digital Control and Energy Management System (DDC/EMS) shall monitor the data environment and perform control functions in relation to a programmed strategy and the status of the data environment. The system shall use solid state computer based digital and analog technology. The system shall be standard with the manufacturer to insure ongoing parts availability and trained technical support. The DDC/EMS shall be of the user programmable type requiring no special computer education for operation. All necessary instruction manuals and user orientation training shall be supplied by the manufacturer or agent thereof. The DDC/EMS shall be UL listed as a Direct Digital Control and Energy Management System. The programmable control requirements of the DDC/EMS shall include, but not be limited to:

OPTIMUM START/STOP (BASED ON HISTORICAL DATA)
TIME OF DAY ROUTINES
SCHEDULED OCCUPANCY ROUTINES INCLUDING HOLIDAYS
CUSTOM TAILORED REPORTING
ACCUMULATING RUN TIME
CRITICAL CONDITION ALARMING
FLUID FLOW SWITCH AND CONTROL ALARMING
PID CONTROL ON ANALOG OUTPUTS
HOT WATER RESET
DAY/NIGHT SETBACK

LEG 21188 230923 - 3 Printed: 8/31/2022 3:48 PM Revision Date: 08/31/22

ECONOMIZER/PURGE CUSTOM TAILORED REPORTING ACCUMULATING RUN TIME SEPARATE MODES AS REQUIRED BY CONTROL SEQUENCE

- B. Environment: The DDC/EMS shall operate in an environment of 40 120 degrees F and 10 95% relative humidity. Sensors and control elements shall operate under the temperature, pressure, humidity, and vibration conditions normally encountered in the installed location. The DDC/EMS shall maintain accuracy as follows:
 - 1. \pm 0.5 F for the space temperatures in the 0 F 130 F range.
 - 2. +/ 0.5 F for duct temperatures in the 40 F 130 F range.
 - 3. +/ 1.0 F for outside air temperatures in the 30 230 F range.
 - 4. +/ 1.0 F for water temperature in the 30 230 F range.
 - 5. KWH and KW monitoring within 1.0%.
- C. Battery Backup: The system shall be tolerant of power failure and hold memory for a minimum of 12 hours. On power restoration, the system shall automatically and without operator intervention of execution of manual restart procedures:
 - 1. Come On Line.
 - 2. Update all monitored functions.
 - 3. Resume operation based on current time and status.
 - 4. Implement special building start up strategies as required.
 - 5. Log time of power outages and start ups.
- D. Program Storage: The system shall also be capable of interfacing with a mass storage (tape or disc) device, for use in uploading and downloading programs to the DDC/EMS.
- E. Protocol: Protocol shall be BACnet.

2.2 SYSTEMS DESCRIPTION:

- A. Modular Design/Expandability: The DDC/EMS shall be of a modular design providing distributed processing capability, and allowing future expansion of both input/output points and processing/control functions. System size shall be expandable from 4 input points and 4 output points to unlimited. Expansion shall be in modules. The modular DDC/EMS shall be configured on the main/local concept. The main controller shall have the capability of adding local controllers and the local controllers shall be capable of adding I/O modules.
- B. Main (Master) Description: The master shall function as the overall system coordinator, accept control programs, perform automated energy management functions, control peripheral devices and perform all necessary mathematical calculations. The master shall be a microcomputer of modular design. The word size shall be 16 bits or larger, with a memory cycle time less than 1 microsecond. All chips shall be second sourced. The master shall have the following:
 - 1. Protected Access: Key lock protected access to output override switches and internal circuitry.
 - 2. Memory: The master shall have at least 2 MB of user available memory, in addition to memory required for systems operation and diagnostics or MCP

LEG 21188 230923 - 4 Printed: 8/31/2022 3:48 PM Revision Date: 08/31/22

- software. Minimum requirements for system operation are as follows: A minimum of 4MB of RAM shall be provided for masters with expansion up to 8MB. The 8MB versions shall include a floating-point math co-processor.
- 3. Real Time Clock: The master shall have a battery backed uninterruptable "Real Time Clock". The accuracy shall be within ten seconds per day. The RTC shall provide the following information: Time of Day, Day, Month, Year, and Day of Week. The system shall be programmed to automatically correct the clock for day light savings time and leap years.
- 4. Power: The master shall operate from 120 VAC +/- 20%, 60 Hz. Line voltages below the operating range of the system shall be considered outages. The master shall have over voltage surge protection, and require no additional AC power signal conditioning.
- 5. Parallel Processing: The master shall be capable of parallel processing, executing separate control programs simultaneously. Any control program may affect control of another program if desired. Each program shall have full access to all I/0 facilities of the processors.
- 6. Communications Processor: Each master shall provide communication to both the Workstation(s) (LAN) and the field buses (RS-485). In addition, each master must have at least 3 other communications ports that support a telephone modem, portable service tool, serial printer and connection to third party controllers such as a chiller control panel or Variable Frequency Drives. On a LAN/WAN system the master(s) shall be provided with a 10Mbps plug-in Ethernet TCP/IP network interface card (NIC).
- 7. Uninterruptable Functions: Control functions shall not be interrupted due to program entry or other user communications.
- C. Local Controller Units: The local units function as a stand-alone controller and as an Input/Output interface of the DDC/EMS and the Data Environment.
 - 1. Monitoring: Local units shall be used to connect the data environment to the system and contain all necessary Input/Output functions to read field sensors and operate controlled equipment based on internal instructions or instructions from the Master. The units shall be fully supervised to detect failures. The units shall report the status of all points in its data environment at the rate of at least once every second. Local units shall connect directly to the Master with a twisted pair shielded RS-485 interface. All local units can run independently in the event of a central unit failure.
 - 2. Unit Failure: Upon failure of the unit (including transmission failure), the unit shall automatically fail off or to a predetermined state for three-way valves. A message shall be transmitted by the unit indicating a local unit failure.
 - 3. Power: The unit shall operate from 120 VAC, +/-20%, 60 Hz, 220 VAC, +/-20%, 50 Hz or 24 VAC +/- 20%, 50/60 Hz power. For voltages below the operating threshold the unit shall totally shutdown and de energize its outputs.
 - 4. LAN and/or Field Bus: Each unit shall communicate with any unit through the RS-485 interface LAN and/or field bus.
 - 5. Auxiliary Port: Each unit shall be equipped with an auxiliary port to allow local interrogation of input and output values, and keyboard override of outputs through laptop.

LEG 21188 230923 - 5 Printed: 8/31/2022 3:48 PM Revision Date: 08/31/22

2.3 INPUT/OUTPUT CAPABILITY:

- A. Inputs: The DDC/EMS shall accept information in the form of a temperature, voltage, digital signal (on off) or pulse counter.
 - 1. Analog Inputs: The Analog Input (AI) function shall monitor each analog input, perform A/D conversion, and hold the digital value in a buffer for interrogation. The A/D conversion shall have a minimum resolution of 10 bits. Input ranges shall be within the range of 0 10 VDC.
 - 2. Digital Inputs: The Digital Input (DI) function shall accept dry contact closures and voltage level or resistance level (5VDC reference voltage) transitions. A voltage level below 1 volt or a resistance below 500 ohms shall be read as ON (closed), a voltage level above 3 volts or a resistance above 1400 ohms shall be read as OFF (open).
 - 3. Pulse Accumulator Inputs: The pulse accumulator function shall have the same characteristics as the DI, except that, in addition, a buffer shall be included to totalize pulses between interrogations. Each input shall accept pulses at a minimum of 2 per second.
 - 4. Temperature Inputs: Temperature inputs originating from a thermistor shall be monitored and buffered as an AI, except that, automatic conversion to degrees F shall occur without any additional signal conditioning.
 - 5. Input Wiring: All analog inputs shall be two wire devices, with shielded wire for accurate operation.

B. Outputs:

1. Master and local controllers - Form C relay outputs rated at 5 amp, 24 VAC/DC or 2 amp, 30 VAC for on/off or Pulse Width Modulation for maintained operation of field devices. Output pulse width shall be selectable between 0.1 and 3200 seconds with a minimum resolution of 0.1 seconds. Isolation and protection against voltage surges shall be provided. Central plant controllers shall be equipped with an ON/OFF/AUTO switch to manually obtain either output state. Manual overrides shall be reported to the master at each update. An LED shall be provided to indicate the state of each digital output.

2. 4 SOFTWARE:

A. User Software: Provide software for On-Campus workstation, Laptop Computer (Service Tool) and District office workstation (required upgrades and programming only if software is already existing on District office workstation).

B. Software Features:

1. Mathematical Requirements: The DDC/EMS shall have a math package capable of addition, subtraction, multiplication, division, square root, greater than and less than functions, minimum and maximum selection functions, and up to five levels of parenthesis for computation of variables. Control commands may be executed based on these calculated variables which are available to the program on a global basis. Math expressions may be used in action and exit commands of control program. The mathematical software shall be capable of mixed mode arithmetic, utilizing Boolean logic statements in combination with basic arithmetic to provide conditional mathematical computations.

LEG 21188 230923 - 6 Printed: 8/31/2022 3:48 PM Revision Date: 08/31/22

- 2. Passwords: The DDC/EMS shall have multiple levels of user programmable passwords in addition to a master password, for programming security. Separate passwords may be user programmed. Level of password will define user's access level and ability to change system.
- 3. Trend Logging: The DDC/EMS shall trend log variables. Any system variable (inputs, outputs, numerals, can be trend logged.
- 4. Messages: The DDC/EMS shall provide alarming, preventative maintenance and status reporting messages.
- 5. Look Up Tables: The DDC/EMS shall have preprogrammed "LOOK UP" tables for the conversion of voltage inputs into dew point temperature and water vapor pressure values for the computation of relative humidity and enthalpy.
- 6. Documentation Format: The programming language of the DDC/EMS shall be plain English based such that a printout of the control program shall serve as the primary documentation for the system.
- 7. Micro Processor Integrity Checking: Each DDC/EMS microprocessor shall continuously monitor and check itself and produce error messages in the event of a malfunction.
- 8. Data Plotting: The DDC/EMS shall provide plots of values of system variables on a graph. Graphs may consist of combinations of up to 3 system variables at a time from the history logs.
- C. Color Graphics Requirements Provide color graphics which allow user to access and change (based on user access level) all schedules and setpoints (including damper or control valve positions) directly through the user graphics. Real time data shall continuously be updated. Navigation between the screens (forward and backwards) shall be accomplished with the use of a mouse. The minimum graphic screens shall include the following:
 - 1. Site lay-out locations of all equipment being controlled, control component locations, and spaces served. Provide multiple screens-minimum of 1 screen per building plus site and others as needed for clarity. By "clicking" mouse on the desired equipment area a flow diagram will be displayed for the related equipment (as described below Item 2). By "clicking" the mouse on a conditioned space, a graphic display of the zone conditions (as described below Item 3) will be displayed.
 - 2. Flow diagrams shall be provided for each HVAC system, such as air-handling system, chilled water system, hot water system, condenser water system, package unit system, brine system with all inputs and outputs dynamically displayed.
 - 3. Each temperature control zone shall have a screen providing set points, temperatures, and related HVAC system status data.
 - 4. Scheduling screens allowing On/Off times to be set for all of the following:
 - a. Pre-determined individual days
 - b. Pre-determined blocks of days (From/To)
 - c. Schedules for "Routine" school sessions
 - d. Schedules for "Special" school sessions
- D. Software Manual: The software manual shall describe programming and testing, starting with a system overview and proceeding to a detailed description of each software feature. The manual shall instruct the user on programming or reprogramming any portion of the system. This shall include all control programs, variables, set points, time periods,

LEG 21188 230923 - 7 Printed: 8/31/2022 3:48 PM Revision Date: 08/31/22

messages, passwords and other information necessary to load, alter, test and execute the system. The manual shall include commands, editing and writing control programs, printouts and logs, mathematical calculations, and instructions on modifying any control point, verifying error status, changing passwords, and initiating or disabling control programs.

E. Software Licenses: The owner shall be named the license holder of all software associated with any and all incremental work on the project(s). Owner shall receive ownership of all job-specific software configuration documentation, data files, and application-level software developed for this project. This shall include all custom, job-specific software code and documentation for all configuration and programming that is generated, and any related LAN/WAN/Intranet and Internet connected routers and devices. Any and all required IDs and passwords for access to any component or software program shall be provided to the Owner.

2.05 USER INTERFACE:

- A. Character Code: Communication with the DDC/EMS shall be ASCII format, or manufacturer's management communication program.
- B. External Communication Interface: In addition to the LAN/WAN communication capabilities specified in paragraph 1.3, C, each master unit shall communicate through an EIA RS232C serial port. Communication may be accomplished with any RS232C compatible terminal. Baud rate shall be selectable from 300 to 19.2 baud. The master shall also provide a spare RS232C serial port for communication to an alarm printer. The software shall provide the ability to direct alarm messages and text reports to either the District workstation and On-site workstation via the LAN/WAN, the spare port or the primary communication port based on time of day, type of alarm, etc.
- C. Direct Computer Communication: The DDC/EMS shall have a computer compatible communication mode for communication with other intelligent devices, which performs data integrity checking, with automatic retransmission of data when errors are detected.
- D. On-Campus Operator Workstation: Hardware shall be furnished by District. Install DDC/EMS software on workstation, and furnish Software license for workstation to District. Coordinate hardware requirements with District.
- E. Laptop Computer (Service Tool): Hardware shall be furnished by District. Install DDC/EMS software on laptop, and furnish Software license for workstation to District. Coordinate hardware requirements with District.

2.6 SYSTEM COMPONENTS:

- A. Control Components:
 - 1. Wall Switches: Plates for all wall switches and timers shall match those specified in Division 26.
 - 2. Labels: All labels, signs, etc. shall be engraved, laminated plastic, white on black background, 1/8" high lettering, minimum.
 - 3. Temperature Sensors:

LEG 21188 230923 - 8 Printed: 8/31/2022 3:48 PM
Revision Date: 08/31/22

- a. Sensor Type: All temperature sensors shall be made of a highly stable, precision thermistor material accurate to within +/- 0.36 Degrees F. Identify each temperature sensor with a "Lamicoid" label keyed to the control system as-built drawings.
- b. Room Sensor: Room temperature sensor shall have Executive Decorator housing with programmable visible temperature indication. Housing shall include an occupancy override, temperature setpoint adjustment and a service tool jack.
- c. Vandal Resistant Room Sensor: Where noted, shall be a blank stainless steel wall plate with the sensing element bonded to the back side. The plate back shall be insulated to reduce wall temperature influence.
- d. Duct Sensor: Duct temperature sensor shall be a probe type element with 9 inch insertion length. Element shall be installed where air mixture provides a true temperature indication. Where adequate mixing is not practical, the duct temperature sensor shall have an averaging type thermistor element, installed across the entire cross section of the duct.
- e. Outdoor Air Sensor: Outdoor air temperature sensor shall be a probe type element mounted in a ventilated, treated white PVC sun shield to minimize radiant energy effects. The sensor and sun shield shall be mounted on a weatherproof outlet box for outdoor installation.
- f. Low Differential Air Pressure Applications (0" to 5" W.C.): The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points. Non-interactive zero and span adjustments, adjustable from the outside cover. (0.00 1.00" to 5.00") W.C. input differential pressure ranges. 4-20 mA output. Maintain accuracy up to 20 to 1 ratio turndown. Reference Accuracy: +0.2% of full span.
- 4. Temperature Control Panels: Each panel and each control device or readout on the front of the panel shall be identified with a laminated plastic label with 1/4" high engraved lettering, white on black background. Pilot lights shall be the push to test type.
- 5. Smoke Detectors: Furnished and installed by Division 26. Power and fire alarm wiring by Division 28. Control wiring by Division 23. Coordinate with Division 26
- 6. Status Sensor: Current sensing status sensor (with sensitivity adjustment for belt loss detection).
- B. Lighting Contactors: Lighting contactor with metal enclosure will be furnished, installed, and wired to the lighting panel by the electrical contractor. See electrical contract documents for location. The DDC/EMS Contractor shall provide low voltage relay(s) required at the contactor panel and wire to the contactors to complete the DDC/EMS side of the lighting control. DDC/EMS Contractor shall provide required photo cells. Relays shall be suitable for up to 277 volts.
- C. Lightning Arrestor and Surge Suppressors: Shall be provided as approved and/or manufactured by the DDC/EMS equipment manufacturer.

LEG 21188 230923 - 9 Printed: 8/31/2022 3:48 PM Revision Date: 08/31/22

D. Conduit: Conduit to be a minimum 1" diameter, and to have at least 25% spare capacity, except drops to room sensors may be run in ½" conduit. Conduit shall be run in electrical or mechanical trenches wherever possible. Site conduit (building to building) will be installed (and terminated inside the building) by Division 26.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION:

- A. General: All electrical work shall be in accordance with the California Electrical Code and the Electrical Specification Sections. All electric/electronic systems shall be hardwired in conduit. Wiring shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed wiring shall run parallel to room surfaces; location shall be approved by the Architect. No structural member shall be weakened by cutting, notching, boring or otherwise. Provide a 120 volt circuit for each device requiring external power. Dedicated circuits shall be provided where required. Any devices or wiring exposed to the weather shall be protected in weatherproof enclosures such as NEMA 3R and weatherproof conduit.
- B. Labeling of System: DDC/EMS Contractor shall provide complete labeling of all terminals at all panels or equipment terminal strips and wiring. Equal to Brady marking on wires and number on terminals in sequence corresponding to control diagram.

C. Programming:

- 1. The Direct Digital Control and Energy Management System (DDC/EMS) operational program shall be provided by the DDC/EMS Contractor. The DDC/EMS Contractor shall be responsible for programming the system and shall coordinate the scheduling (on/off times) with the Owner. Prior to start-up, the DDC/EMS Contractor shall provide any testing program he feels necessary to fully test the operation of the various components.
- 2. The DDC/EMS Contractor shall load the operational program into the DDC/EMS controller from his office via the system's modem or at the job site via a direct connect cable. Prior to starting up the system, the DDC/EMS Contractor shall:
 - a. Confirm that the control system has been connected to the District's LAN/WAN, a dedicated telephone line, and that the LAN/Wan and the phone line and system modem is working.
 - b. Confirm the functionality of the DDC/EMS controllers and all input points by reading the input values, and comparing them with a measured temperature, pressure, voltage, current, or resistance as appropriate.
 Calibrate all transducers as required.
 - c. Confirm the functionality of all digital output points by manual operational of the relay contacts. Use proper discretion in starting and stopping equipment.
 - d. Confirm the functionality of all analog output points by manually imposing an adjustable voltage on the appropriate circuit to check proper operation of the controlled device. Calibrate all transducers as required.
 - e. The DDC/EMS Contractor shall notify the General Contractor (one week in advance of) when the system will be ready for loading and testing the

LEG 21188 230923 - 10 Printed: 8/31/2022 3:48 PM Revision Date: 08/31/22

operational program. The DDC/EMS Contractor's start-up technician shall be present while the program is being loaded and shall communicate with the programmer prior and after program loading to confirm proper operation.

- D. Training: Prior to final acceptance, the DDC/EMS Contractor shall provide operational training to the Owner's personnel. The training sessions shall include a complete demonstration of the system. Dates and times of the training sessions shall be coordinated through the Owner not less than one week prior to session. A total of 40 hours of instruction shall be provided 24 hours initially, and 16 hours to be spread throughout the first year of operation. The DDC/EMS Contractor shall maintain a log of training sessions including dates, times and names/titles of those attending. The DDC/EMS Contractor shall submit a copy of this log on request.
- E. Testing and Acceptance: The DDC/EMS Contractor shall furnish a complete and operating system. The DDC/EMS Contractor shall also verify, in the presence of the Owner, the system accuracy and proper function of each controlled device and sensor. The following items shall be successfully demonstrated prior to acceptance by the Owner:
 - 1. All system outputs including controllers, relays, and other control devices shall be addressed and start/stop functions demonstrated.
 - 2. All inputs shall be displayed and all event-initiated functions shall be demonstrated.
 - 3. Demonstrate program integrity and power restore sequence during and after a power failure and restoration.
 - 4. Deliver all Record Drawings, wiring diagrams, equipment specifications, installation and Operation Manuals and other documentation as required to describe the system.
 - 5. Complete operator training in the use, programming, and operation of the system.

F. Start-up of the System:

- 1. The start-up period starts when the following conditions are met:
 - a. The DDC/EMS system and all involved HVAC equipment have been installed, connected to the DDC/EMS system and are ready to operate.
 - b. A start-up meeting has been conducted with representative of the General Contractor, Architect/Engineer, maintenance staff, and the DDC/EMS Contractor.
 - c. Consensus is reached, by the representatives at the above referenced meeting that it is appropriate for the start-up process to start.
- 2. The alarm pagers called by the control system during the start-up period shall be the pagers carried by the Mechanical Contractor and/or DDC/EMS Contractor as appropriate. The Mechanical Contractor and DDC/EMS Contractor shall respond to all pages from the control system and work cooperatively to insure that the building environmental standards are maintained.
- 3. The start-up process shall be completed and the warranty period shall start when the following conditions are met.
 - a. All training to be provided as part of the project has been completed.

LEG 21188 230923 - 11 Printed: 8/31/2022 3:48 PM Revision Date: 08/31/22

- b. No "alarm" or "condition reports" are being generated by the DDC/EMS system for seven (7) calendar days (168 hours) due to incomplete or inaccurate installation or programming.
- c. All adjustments and "fine tuning" of the system have been completed.
- d. The phone numbers for the pagers and alarm printer are programmed.
- G. Verification: A written testing and start-up report must be submitted for approval before acceptance. In addition to the DDC/EMS Contractor's testing and start-up report, the Owner may independently verify the test results. The report on test results shall include setpoints and operating ranges of all components.
- H. Software and Licenses: The Owner shall receive all software passwords and have full administrative control. Provide all required software and access licenses to Owner at project closeout.
- 3.2 SEQUENCE OF OPERATION: The below sequences of operation are to be used as a primary guideline for DDC/EMS control logic sequence development. Any/all variations from the below operation sequences must be approved by the District's DDC/EMS operator prior to implementation. All fans providing ventilation to meet minimum outside air requirements shall run continuously during occupied hours. Airside equipment (air handlers, etc.) shall start by normally open relay and signal from DDC/EMS.
 - Heating/Cooling Unit: (Heating setpoint 72°F, Cooling setpoint 75°F) The unit shall run A. per the system operation schedule through the DDC/EMS. Room temperature sensor shall be wall mounted. If the bypass button on the room temperature sensor is activated, the heating/cooling unit shall start for two hours (adj.). The unit setpoint shall be adjustable \pm 2°F (adj.) from a switch located on the temperature sensor. Unit fan shall run continuously on start by the DDC/EMS. DDC/EMS shall control the heating/cooling unit to maintain setpoints. On call for cooling, the DDC/EMS shall start the unit cooling at 2°F (adj.) above cooling setpoint and run to 2°F (adj.) below setpoint for cooling and then stop the unit cooling. On call for heating, the DDC/EMS shall start the unit heating at 2°F (adj.) below heating setpoint and run to 2°F (adj.) above setpoint for heating and then stop the unit heating. The unit shall be capable of economizer operation. The DDC/EMS shall monitor the unit status with a current sensor and the supply air temperature. A factory furnished static pressure sensor shall be installed in the ceiling to control the power exhauster to maintain a 0.05" W.C. (adj.) setpoint when unit is in economizer operation. Provide a co-axial cable switch plate cover for mounting the room pressure sensing port.
 - B. Exhaust Fans: Exhaust fans with variable speed drives are to modulate to maintain duct static pressure. Where no control is indicated, fan shall start/stop by DDC/EMS. DDC/EMS shall monitor fan status with a current sensor.
 - C. Fan Status Sensors: If Fan Status Sensors are installed, they will not be interlocked to the cooling/heating call or heat/cool valve operation in the DDC/EMS control logic.
 - D. Domestic Hot Water Circulating Pump (CP-1): Shall start/stop by DDC/EMS. DDC/EMS shall monitor pump status with a current sensor.

LEG 21188 230923 - 12 Printed: 8/31/2022 3:48 PM Revision Date: 08/31/22

2123

DIRECT DIGITAL CONTROL AND ENERGY MANAGEMENT SYSTEM

E. Outside Lighting: Outside lighting points currently controlled by DDC/EMS shall remain. Provide additional points, if required by the Electrical Drawings. Coordinate with Division 26.

END OF SECTION

LEG 21188 230923 - 13 Printed: 8/31/2022 3:48 PM
Revision Date: 08/31/22

SECTION 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

All work under Divisions 26, 27, and 28 is subject to the General, Supplementary, Special Conditions and other Division 1 Specification Sections preceding this section. The Contractor will be responsible for and governed by all requirements. Drawings indicate the general arrangement of the electrical layout and work included. The Contractor will follow these drawings to lay out and check the drawings of other trades to verify locations and spaces in which work will be installed.

1.02 SUMMARY OF WORK

- A. This portion of the work includes furnishing of all labor and materials necessary for a complete wiring system to outlets and all equipment shown on the Drawings or covered by this section of the Specifications. In general, the work includes the following:
 - 1. Power service and distribution system as shown, complete with panelboards and feeders.
 - 2. Complete system of branch circuit wiring and equipment including all wiring devices and plates on all outlets.
 - 3. A new lighting fixture system complete with lighting controls, as shown on Plans, including factory commissioning and acceptance testing.
 - 4. Data, VoIP, Security, Access, and Fire alarm system, conductors, cabling, outlets, and equipment, for complete working systems
 - 5. Raceways, wiring, fused disconnect switches, etc., for equipment covered by other sections of these Specifications.
 - 6. All hangers, anchors, sleeves, chases, and supports for fixtures, electrical equipment and materials including earthquake bracing.
 - 7. All disconnection and removal of any existing electrical facilities not to be reused or noted to be demolished.
- B. The electrical drawings are diagrammatic and do not necessarily show all raceway, wiring, number or types of fittings, offsets, bends or exact locations of items required by the electrical systems. Items not shown or indicated which are clearly necessary for proper operation, payment or installation of systems shown shall be provided at no-increase in contract price.
- C. The exact routing of systems and location of devices and equipment shall be governed by coordination with other trades, structural and architectural conditions. The Architect or Electrical Engineer reserves the right, at no increase in contract price, to make reasonable

changes in location of electrical equipment or wiring systems; so as to coordinate with other systems, group them into orderly relationships, or to increase their utility. Contractor shall verify requirements in this regard prior to roughing in.

- D. Install electrical work in cooperation with other trades and make proper provisions to avoid interferences and coordinate with structural and architectural features, in a manner approved by the Architect or Electrical Engineer. All changes caused by neglect to make such provisions shall be at Contractor's expense. Provide offsets and special fittings, as required to facilitate installation of the work.
- E. When a particular product or type of product is specified with a manufacturer's designation, the latest published specifications, installation, and construction information of the manufacturer shall constitute the minimum acceptable standard. Any substitutions shall be made in accordance with the SUBSTITUTIONS sections of the Specifications.

1.04 RULES AND REGULATIONS

- A. All work and materials shall be in full accordance with the latest rules and regulations of the following:
 - 1. California Electrical Code (CEC), 2019 Edition
 - 2. California Energy Commission, Title 24, 2019 Standards
 - 3. California Fire Code, 2019 Editions
 - 4. National Fire Alarm and Signaling Code NFPA 72, 2019 Edition
 - 5. California Building, Mechanical and Plumbing Codes, 2019 Editions
 - 6. California Code of Regulations
 - a. Title 8, Safety Orders
 - b. Title 19, Fire and Panic Safety Standard
 - c. Title 24, Part 1, Administrative Regulations
 - 7. Occupational Health and Safety Act (OSHA)
 - 8. California State Fire Marshal Rules
- B. Where two or more codes conflict, the most restrictive shall apply.
- C. Nothing in these Plans and Specifications is to be construed to permit work <u>not</u> conforming to these codes.
- D. Before the Final Certificate of Payment will be issued, the Contractor shall deliver to the Owner all Certificates, Permits, Record Drawings and Instructions/Parts Manuals.

1.05 TESTS AND STANDARDS

- A. The tests, standards, or recommended procedures of the following agencies shall relate to all parts of these Specifications and shall be considered a minimum:
 - 1. American National Standards Institute (ANSI).
 - 2. Underwriters Laboratories, Inc. (UL).
 - 3. National Electric Manufacturers Association (NEMA).
 - 4. Electrical Testing Laboratories (ETL).
 - 5. National Fire Protection Association (NFPA).
 - 6. Insulated Power Cable Engineers Association (IPCEA).
 - 7. Institute of Electrical and Electronic Engineers (IEEE).
 - 8. Illumination Engineering Society (IES).

1.06 EXAMINATION OF DOCUMENTS AND SITE

- A. Before submitting a proposal, each bidder shall carefully examine the electrical, mechanical, architectural, and structural drawings and specifications. He shall also visit the site and fully inform himself as to all existing conditions and limitations applying to the work. If, after such examination and study, it appears that any change from the drawings and specifications should be allowed, the bidder shall so state in writing together with any change in cost involved.
- B. By the act of submitting a proposal, each bidder shall be deemed to have made such examinations of the drawings and specifications and premises, and it will be assumed that he is therefore familiar with the entire scope of the project and has based his proposal upon the work described in the Drawings and Specifications and upon all existing conditions and limitations applying to his work.

1.07 IMPLEMENTATION

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

- D. Scheduling: The installations shall be coordinated as to location and time, and interference causing delays and non-acceptable construction shall be avoided. Order equipment in a timely manner to prevent any delays in the construction schedule and he shall bear any penalty by vendors to meet schedules.
- E. Collaboration: Prior to commencing construction the Electrical Contractor shall arrange a conference with the general and sub-contractors as well as equipment suppliers and shall verify types, sizes, locations, requirements, controls, and diagrams of all equipment furnished by them.
- F. Materials: All equipment and materials shall be new, UL (Underwriters Laboratories) approved, and of the best quality. When specific trade names are used in connection with materials they are mentioned as standards but, this implies no right upon the part of the Contractor to substitute other materials or methods without prior approval.
- G. Excavation: The Contractor shall provide all excavating and backfill required for the proper installation of electrical work, whether or not shown on the Drawings or as specified. This shall be done per the EXCAVATION portion of the Specifications.
- H. Cutting and Repairing: The Electrical Contractor shall do all cutting necessary for the proper installation of his work, repair any damage done by himself or his workmen, and coordinate his work with that of others. Do no cutting or patching without approval of the Architect or Electrical Engineer. Round holes through concrete slabs or walls shall be core drilled with a diamond drill, rectangular openings shall be cut with a diamond saw. In no case shall any concrete beam or column be cut.
- I. Sleeves and Openings: Electrical Contractor shall be responsible for all sleeves and openings through walls and floors required by electrical work. All openings around conduits in sleeves shall be sealed with a material of equal fire rating as the surface penetrated. Openings not utilized shall be temporarily sealed in a similar manner. All required sleeves shall be furnished to and coordinated with the General Contractor.
- J. Cleaning and Painting: All exposed work shall be thoroughly cleaned upon completion of work. All panelboards and equipment not located in electrical or mechanical rooms or closets shall be field painted per painting specifications, color as selected by Architect. Panelboard enclosures, fixtures, and equipment, where finish has been marred in shipment or installation, shall be completely refinished. Minor finish damage shall be rectified as indicated by the Architect or Electrical Engineer. Contractor shall remove all waste and rubbish resulting from his work from the site.
- K. Earthquake Restraint: All electrical equipment shall have a means to prohibit excessive motion during an earthquake. Equipment that vibrates during normal operation shall have isolators with mechanical stops. All transformers are considered to vibrate during operation. All electrical equipment and connections shall be designed to resist lateral seismic forces equal to value shown on Drawings of equipment weight with allowable working code capacity increased by 1/3 or 1.5 times the same value for the weight yield capacity. Connections shall be the same except the 1/3 increase will not be allowed.

- L. Mechanical Equipment and Other Special Equipment:
 - 1. Prior to commencing construction, the Contractor shall arrange a conference with the Mechanical and Plumbing Contractors, and the Equipment Suppliers, to verify type, sizes, locations, requirements, controls and diagrams of all equipment furnished by them. In writing, he shall inform the Electrical Engineer that all phases of coordination of this equipment have been covered. If any unusual conditions or problems arise, they are to be enumerated them at this time.
 - 2. The Contractor shall furnish all electrical line voltage wiring, fused disconnects and conduits, unless otherwise shown.
 - 3. The Contractor shall be responsible for electrical hook-up and connection to all electrical equipment furnished by all Contractors of this Project. This includes all mechanical equipment, plumbing equipment, and special equipment furnished by other contractors.
- M. Portable and Detachable Parts: The Contractor shall retain in his possession and shall be responsible for all portable and detachable parts or portions of the installation such as fuses, keys, locks, adapters, locking clips, and inserts until final completion of his work. These parts shall be itemized and delivered to the Owner at Project Closeout.

1.08 QUALITY CONTROL

- A. Supervision: The Contractor shall personally, or through a competent representative, constantly supervise the work from beginning to completion and final acceptance. He shall cooperate fully with the inspection authorities in the provision of information and access to the work. He shall, to the best of his ability, maintain the same job foreman throughout the life of the project unless a replacement is requested or authorized by the Architect or Electrical Engineer.
- B. Inspection and Tests: The Contractor shall furnish all labor and test equipment required to fully test and adjust the equipment installed under this specification and demonstrate its proper operation.
 - 1. Arrange for all tests and inspections and provide minimum 48 hours' notice to the Architect or Electrical Engineer.
 - 2. A test must demonstrate that each piece of equipment, outlet, fixture, device, and appurtenance is in sound operating condition and in proper cooperative relation to associated equipment.
 - 3. All tests shall be conducted under supervision of the Architect or Electrical Engineer, and any defects of any nature which are apparent as a result of such test shall be made correct to the satisfaction of the Architect or Electrical Engineer before final acceptance is made.

- 4. No equipment shall be tested, or operated for any other purpose, such as checking motor rotation, until it has been fully checked in accordance with the manufacturer's instructions.
- C. Warranty: The Contractor agrees to replace or repair, to the satisfaction of the Owner, any part of the installation which may fail due to defective material and/or workmanship or failure to follow Drawings and Specifications, for a period of one year after final acceptance. Any damage to other work resulting from such failure or the correction thereof shall be remedied at the Contractor's expense. The Contractor shall, further, secure from the manufacturers of special equipment, such as signal systems, their respective guarantees and deliver same to Owner. Guarantees between Contractor and his suppliers shall not affect warranties between Contractor and Owner.

1.09 SUBMITTAL

- A. Make submittal for all material to be used on the project, whether as specified or substitutions, within thirty-five (35) days after award of Contract by the Owner, in accordance with Section 01-300, SUBMITTAL, and the following:
 - 1. All submittals shall be neat and bound in a suitable folder or binder.
 - 2. Identify each item by manufacturer, brand, trade, name, number, size, rating, and whatever other data is necessary to properly identify and check materials and equipment. Words "as specified" are not sufficient identification.
 - 3. Identify each submittal item by reference to specifications section paragraph in which item is specified, or Drawings and Detail Number.
 - 4. All submittals shall be submitted in coherent groups; e.g. all light fixtures at one time. No partial, or incomplete submittal will be accepted.
 - 5. Organize submittal in same sequence as they appear in specification sections, articles, or paragraphs.
- B. Product Data: Submit eight copies, in groups, as follows:
 - 1. Boxes, pullboxes, conduits, and raceway types required, including fittings
 - 2. Electric Wire, cable, and connectors
 - 3. Panelboards and disconnects.
 - 4. Lighting fixtures
 - 5. Wiring Devices
 - 6. Fire Alarm System
 - 7. Data, VoIP, and Low Voltage Special Systems

- C. Shop Drawings: Shop drawings shall show physical arrangement, wiring diagram, construction details, finishes, materials used in fabrication, provisions for conduit entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, weight, power sources, circuit numbers, and shall be compatible with the Contract Drawings and Specifications.
- D. Show wiring as actually installed, connected, and identified for this specific project. Include identification of cables and cable conductors.
- E. Shop and instruction drawings shall cover the equipment or device to be installed and not merely the general class of such equipment or device.

1.10 SUBSTITUTIONS

- A. The Specifications or Drawings are in no way to be construed as being proprietary toward one product. Those products, or types of products, listed are intended to set the standard for quality, design, and installation procedure. However, no right is implied upon the part of the Contractor to substitute other materials, products or systems without the written approval of the Architect or Engineer.
- B. All requests for substitution shall be made in accordance with the SUBSTITUTIONS section of the Specifications.
- C. All requests for substitutions shall be in writing, received at least 14 days prior to bid date, and shall indicate all information required thereon including differences from the specified item. The request for substitution shall be accompanied by cuts, product literature, performance data, specifications, drawings, samples or other means as may be required for proper evaluation by the Architect or Electrical Engineer.
- D. All proposed substitutions shall be standard product of the firm under current manufacture and be a catalog item at time of bid.
- E. Acceptance of substitution shall not relieve the Contractor from responsibility for complying with requirements of the Contract Documents. The Contractor shall be responsible for changes in other parts of the work occasioned by his substitutions and shall bear their expense.
- F. Representative samples may be required for determination of equality. It is understood that the samples may be subjected to destructive testing and will not be returned.

1.12 GUARANTEE

This Contractor agrees to replace or repair to the satisfaction of the Owner, any part of the installation that may fail due to defective material and/or workmanship, or failure to follow Plans and Specifications for one year after final acceptance. He shall further obtain from the manufacturers of special equipment (i.e., control systems) their respective guarantees and service manuals and deliver to Owner.

1.13 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

The Engineer's decision will be final on interpretation of the Drawings and Specifications. Whenever "AS MAY BE DIRECTED", "SUITABLE", "APPROVED EQUAL", "AS REQUIRED", or other words of similar intent and meaning are used which infer that judgment is to be exercised, it is understood that it is the judgment of the Engineer being referred to.

PART 2 – PRODUCTS

2.01 RACEWAYS:

- A. Except where specifically shown otherwise in this section, the Contractor shall furnish and install a complete steel, rigid thread galvanized rigid steel conduit system for all wiring, including control and signal wiring.
- B. Galvanized Rigid Steel (GRS)
 - 1. All conduits shall be rigid threaded hot dipped galvanized type.
 - 2. Joints are to be sealed with conductive pipe compound T&B "Kopr-Shield" before making up.
 - 3. Conduits installed below grade shall be wrapped with 3M "Scotchrap #51" corrosion protection tape using half-laps for double thickness. Conduit surfaces are to be clean and dry before wrapping.
- C. Steel Electrical Metal Tubing (EMT)
 - 1. EMT may be used within the hollow dry spaces of buildings, minimum 96" above the finished floor. Trade sizes 4" and smaller may be used within hollow dry spaces of the building.
 - 2. EMT conduit shall be Allied True Color E-Z Pull, or equal.
 - 3. All raceway fittings, locknuts, couplings, elbows, etc., shall be hot dipped galvanized steel finish with plastic throats or bushings. <u>Cast-type fittings shall</u> not be used.
- D. Non-Metallic Polyvinylchloride Conduit (PVC):
 - 1. Rigid nonmetallic PVC, UL labeled, and fittings approved for the purpose may be used for electrical systems 0-600V-to-ground under the following conditions:
 - a. All conduits in earth under buildings or protected by permanent paving may be Schedule 40 PVC. Any conduits running through planters or unprotected are to be encased in 3" of concrete. All raceways above grade are to be steel.
 - b. Risers shall be blue color, factory PVC coated T&B "Ocal" steel ells.

Bends less than 45 degrees and offsets may be field bent.

- 2. All nonmetallic runs shall have a bond wire for the interconnecting of all conducting portions per Article 250 of the California Electric Code.
- 3. PVC shall never be used above grade.
- E. Liquid-Tight Flexible Metal Conduit (LFMC):

LMFC may be used in lengths not greater than 36" at motors and other machinery to prevent the transmission of vibration. LFMC shall be supported at both ends.

- F. Surface raceways and fastenings are to be two-piece steel type, complete with all fittings of the same manufacturer and factory finished in gray. Surface plug-in strips shall be two circuit type with NEMA grounded receptacles every 12" with wiring space provided.
- G. The minimum size conduit for lighting, power, and signal wiring shall be 3/4" trade size.
- H. Conduits installed underground shall have a minimum coverage of 24" below a finished grade. Provide a magnetically traceable warning tape at 12" below grade. Electrical systems rated greater than 150V to Ground shall have a 3" concrete envelope.
- I. MC Cable for branch circuits with EMT Home Runs.

2.02 CONDUCTORS:

- A. All conductors shall arrive to the project in their original, unbroken packages plainly marked as follows:
 - 1. Packaging shall indicate underwriter's labels, size, conductor material, insulation of wire, names of the manufacturer and the trade name of the wire.
 - 2. Wire or cable shall have factory markings every 24". Markings shall show its maximum allowable voltage, wire size and insulation.
- B. All conductors shall be a minimum of 98% conductivity, soft drawn copper, minimum #12 AWG unless shown otherwise. Conductors sized #8 and larger shall be stranded. Conductors sized #10 and smaller shall be solid type, except wiring within fixtures. Insulation shall be 600 Volt, type "THWN-2."
- C. Control circuits for mechanical equipment in locations subject to abnormal temperatures on or under furnaces and heaters shall be Type "RHH" 600 Volt insulation conductors.
- D. All branch circuits, fixture wiring joints, splices, and taps for conductors #10 and smaller to be made with "Scotchlok" connectors.
- E. Two-bolt type solderless connectors or T&B "ColorKeyed" compression lugs shall be used on #8 and larger conductors.
- F. Soft drawn compact Aluminum feeder conductors may be used for phase conductors

sizes # 1/0 and above and grounding conductors # 6 and above. Provide compression lugs with oxidation inhibitor for all aluminum termination.

2.03 WIRING DEVICES:

- A. Furnish and install wiring devices and plates as shown on the Drawings and described in these Specifications. Where more than one wiring device is mounted in the same location, such devices shall be mounted in a multi-gang plate. Wiring devices shall be specification grade or better.
- B. Wiring devices shall be of the color selected by the Architect.
- C. Convenience outlets to consist of a specification grade duplex receptacle mounted in an outlet box in the wall, flush with the finished plaster or surface. Outlet rating to be 20 AMPS, 125 Volts, 3-wire, back and side wired.
- D. All outlets shown outdoors or in damp locations shall be GFI type, installed in a weatherproof box and cover equipped with rubber gaskets. Surface outlets shall be weatherproof type FS boxes with hubs as required and equipped with rubber gaskets and weatherproof covers.
- E. Local switches shall be quiet toggle type, totally enclosed, 20 AMPS, 277 Volts AC rated.
- F. Device plates shall be provided for all devices with the number of gangs and openings necessary. They shall be satin brushed 302 stainless steel, unless specified otherwise.
- G. Switch plates for all outlets not in sight of a switch shall be labeled with filled etched letters showing locations of the outlet controlled.
- H. Pilot lights shall be the type with an indicating neon or LED lamp in a handle.

2.04 OUTLET BOXES:

- A. Outlet boxes for concealed work shall be one-piece, pressed steel, knock-out type with zinc or cadmium coating. Boxes shall not be smaller than 4" square nominal size unless otherwise indicated. Provide extension rings, extenders, plaster rings and covers necessary for flush finish. No back-to-back or through-boxes shall be used.
- B. Bar hangers shall be used to support outlet boxes in stud or furred partitions and ceilings. Attachment screws, devices, etc., shall be of the proper type to secure boxes to metal studs. Use expansion shields in concrete and masonry. Where used for lighting fixtures, outlet boxes shall be equipped with fixture studs.
- C. Provide approved knock-out seals on all unused open knock-out holes.
- D. Outlet boxes installed in concrete slabs shall be two-piece concrete boxes, not less than 4" nominal size with a minimum depth of 2 ½".
- E. Surface boxes of cast metal threaded hub-type with suitable gasketed covers shall be used

for exposed conduit runs less than 5' above finished floor, or where waterproof boxes are required.

2.05 PULL BOXES AND WIREWAYS:

- A. Pull and junction boxes shall be installed as shown to ease the pulling of wire and to comply with CEC requirements.
- B. Wireways shall be constructed in accordance with UL 870 for wireways, auxiliary gutters and associated fittings. Every component, including lengths, connectors, and fittings, shall be UL listed.

2.06 TERMINAL CABINETS AND CLOSETS:

- A. Cabinets and fronts shall be in accordance with NEMA Standard Publication No. PB 1-1971 and UL Standard No. 67. Fronts shall include doors and have flush brushed stainless steel, cylinder tumbler-type locks with catches and spring-loaded door pulls. The flush lock shall not protrude beyond the front of the door. All locks shall be keyed like the panelboard locks. Fronts are to be adjustable indicating trim clamps that shall be completely concealed when the doors are closed.
- B. Doors shall be mounted by completely concealed steel hinges. Fronts shall not be removable with the door in the locked position. A frame and card with a clear plastic covering shall be provided on the inside of the door. Fronts shall be of code gauge full finish steel with rust inhibiting primer and baked enamel finish.
- C. Install finish grade 3/4" plywood board, primed and painted light gray on both sides and the edges, at the interior rear surface of telephone and signal cabinets.
- D. Provide solderless box lugs, terminal blocks with a white marking strip for conductors sized #16 and larger. Punch-down terminals shall be used for No. 18 and smaller and shall be used for all public address, intercom and other electrical terminations.

2.07 FLOOR BOXES:

- A. Provide fully adjustable Type 1, Class 1 watertight 2 hour rated poke through floor pockets complete with wiring devices where shown on Plans.
- B. Fittings for floor box cover finish shall be as selected by Architect.
- C. Verify floor finish prior to purchase. Provide carpet flanges of proper size in carpeted or tiled areas.

2.08 NOISE CONTROL:

- A. Outlet boxes at opposite sides of partitions shall not be placed back-to-back or through-boxes employed except where specifically permitted on the Drawings by note to reduce transmission of noise between occupied spaces.
- B. Contactors, starters, and similar noise-producing devices shall not be placed on walls that

are common to occupied spaces unless specifically called for on the Drawings. Where such devices must be mounted on walls common to occupied spaces, they shall be shock mounted or isolated in such a manner to effectively prevent the transmission of their inherent noise to the occupied space.

C. Contactors, starters, drivers, and like equipment found noticeably noisier than other similar equipment on the project will be deemed defective and shall be replaced at Engineer's request.

PART 3 – EXECUTION

3.01 INSTALLATION - GENERAL:

- A. The layout and installation of electrical work shall be coordinated with the overall construction schedule to prevent delay in completion of the project. Checking these Drawings before organizing the electrical work schedule or installing material and equipment shall be obligatory.
- B. Dimensions and information regarding accurate locations of equipment and structural limitations and finish shall be verified with other sections.
- C. The Drawings do not show all the offsets, bends, special fittings, junction boxes, or pull boxes necessary to meet job conditions and the CEC. They shall be provided as required.
- D. Electrical equipment, outlets, junction and pull boxes shall be installed in accessible locations avoiding obstructions, preserving headroom, and keeping openings and passageways clear.
- E. Minor adjustments in the locations of equipment shall be made where necessary, providing such adjustments do not adversely affect function of the equipment. Major adjustments for the location of equipment shall be approved by the Architect and detailed on the Record Drawings.
- F. <u>Structural Fittings</u>: Furnish and install the necessary sleeved, inserts, hangers, anchor bolts and related structural items. Install at the proper time.
- G. Openings have been shown on the Architectural and Structural Drawings. Should any additional openings or holes be required for the work of this section, the cost shall be the obligation of this section.
- H. Contractors shall inspect and account for existing conditions affecting his work.
- I. Sleeves for electrical conduits passing through walls or slabs shall be placed under the work of this section <u>before</u> concrete is poured. Where conduits pass through suspended floor slabs, sleeves shall be standard weight galvanized steel pipe extending 2" above the finished floor level.
- J. Sleeves at other locations shall be either light weight galvanized steel pipe or galvanized sheet steel. Clearance between conduits and sleeves shall not be less than ½".

- K. Sleeves through outside walls and below grade shall be caulked tight with oakum and the ends sealed with an approved semi-plastic coal tar base compound or shall be of the stuffing box type. Other sleeves shall be packed with glass wood ends sealed with Duxseal and covered with chrome plated escutcheon plates.
- L. Conduits entering through floor slabs at grade level will not require sleeves and shall be placed with tops of couplings flush at floor level.
- M. Sleeves for electrical conduit passing outside walls below grade shall be the through-wall and floor seal type.

3.02 INSTALLATION OF CONDUITS AND RACEWAYS:

- A. Raceways for electrical or signal systems run in earth that are not protected by permanent paving shall be encased in concrete with the encasement extending under the building. Branch circuit and signal system conduits installed underground between outlets, terminals, and panels within the building shall be liquid and gas tight.
- B. Conduits shall be concealed unless otherwise shown. All conduit runs exposed to view, except those in attic spaces, shall be installed parallel or at right angles to structural members, walls, or lines of the building.
- C. All conduit runs shall be mechanically and electrically continuous from outlet to outlet.

 Conduit size or type shall not be changed between outlets.
- D. No conduits shall be run on the roof unless specifically shown on the roof. They shall be full weight rigid steel on PVC sleepers. Install roof jacks at penetrations.
- E. Conduit stubs installed for future extensions shall be rigid steel for at least 5' of a conduit run. The conduit ends shall be terminated with couplings and pipe plugs. The closed end shall be double wrapped with Scotchrap #50 for the last 12". The concrete envelope shall leave 3" of the wrapped conduit exposed for future connection.
- F. Conduit for equipment connected permanently to the floor shall be installed with a 6" rigid conduit nipple to a flush coupling to ensure a watertight connection at the floor.
- G. All conduits shall be sloping to drain and shall be sealed with JM Clipper "Duxseal" on the high end.
- H. All conduit bends shall be carefully made so that the conduit is not flattened, kinked, or otherwise compromised. The inner radius of any conduit bend shall be not less than eight times the inside diameter. Where conduits are run exposed in groups, bends of all conduits shall have a common center. <u>Use of standard elbows will not be allowed at these</u> locations.
- I. Each run of a conduit shall be finished before concrete, plaster, etc., is installed to ensure against obstruction or omissions. After installation, the ends of all conduits shall be plugged with metal pennies. All conduit systems shall be completed and thoroughly cleaned and dried inside before installation of any conductors.

- J. Conduits shall enter at right angles and be connected to all outlet boxes, pull boxes, and cabinets with locknuts and plastic throated grounding bushings, providing a continuous grounding system in accordance with CEC Article 250.
- K. Use Erikson couplings where a union is necessary. Running threads will not be permitted.
- L. Pull 1/8" stranded nylon pull ropes with 18" coiled at each end in all empty conduits with identification tags indicating source and destination.
- M. Furnish and install seal-offs in all conduit runs through areas of different temperature.
- N. All concealed conduits shall be installed in as direct a line as possible between outlets. No more than four (4) quarter bends or their equivalent will be allowed between outlets. Feeder conduits shall follow arrangement shown on Plans unless a change is authorized. In general, branch circuit conduits shall follow the arrangement as shown insofar as structural conditions permit.
- O. All exposed runs shall parallel buildings, walls, or partitions, and shall be supported on Kindorf Hangers to meet Title 24 Part 6, California Code of Regulations.
- P. All telephone, data, and other signal conduits shall be installed with long radius sweeps. No factory ells will be permitted.
- Q. Chrome escutcheon plates are to be used on all conduit penetrating walls, floors or ceilings.
- R. Expansion joints shall be provided at building structural expansions or as required due to length of run or difference in temperatures.
- S. All fittings exposed or in damp areas shall have sealing glands and proper gaskets. Fittings in hazardous areas shall be of the type approved for the particular hazard.
- T. Provide two 1" conduit stubs out of all panels and terminal cabinets to above a hung ceiling or as otherwise shown.

U. Roof Penetrations:

1. Where raceways penetrate roofing or any similar structural area, provide iron roof jacks sized to fit tightly to a raceway for a weather-tight seal with the flange extending a minimum of 9" under roofing on all sides. Completely seal the opening between the inside diameters of the roof flashing and the outside diameters of the penetrating raceways. Coordinate all work with the roofing section of Specifications.

V. Fire Penetration Seals:

1. Seal all penetrations for work of this section through fire rated floors, walls and ceilings to prevent the spread of smoke, fire, toxic gas or water through the penetration before, during or after a fire. The fire rating of the penetration seal

- shall be at least that of which it is installed so that the original fire rating is maintained as required by CEC Article 300.21.
- 2. Where applicable, provide OZ Type CFSF/1 and CAFSF/1 fire seal fittings for conduit and cable penetrations through concrete and masonry walls, floors, slabs and similar structures. Apply an approved firestopping system, including wall wrap, partitions, caps and other accessories as required. All manufacturers' instructions and recommendations for installation of sealing fittings and barrier sealing systems.

3.03 CONDUCTORS AND CONNECTIONS:

A. General Requirements:

- 1. All branch circuit and fixture wiring joints, splices and taps for conductors #10 and smaller shall be made with UL approved connectors listed for 600 Volts. Connector bodies shall consist of a cone shape rotating expandable coil spring inserts insulated with phenolic or plastic shell.
- 3. <u>Do not</u> install wire in conduits until all work of any nature that may cause injury (including pouring of concrete) is completed. Use care in pulling in wires to prevent damage to wire or insulation. <u>Do not</u> use blocks, tackle or other mechanical means to pull #8 AWG or smaller conductors.
- 4. Splices <u>are not permitted except in outlet boxes</u>, pull boxes, junction boxes, panelboard gutters and auxiliary gutters. <u>No splices shall be made in underground boxes</u>.
- 5. Use only wire pulling compounds listed by the UL as a lubricant for pulling conductors through raceways. The use of cleaning agents that have deleterious effect on conductor coverings are not permitted.
- 6. Unless otherwise shown on Plans or specified elsewhere, leave at least 12" of free conductors at each connected outlet (outlets connected to equipment or device) and 9" of free conductors and coil neatly in outlet box for future connection.

B. Terminations:

- 1. Circuit and signal terminations to single screw or push on terminals shall be done with insulated "Sta-Kons" or approved equal terminals.
- 2. Bolt type solderless connectors shall be torqued with a torque wrench according to the manufacturer's recommendations and then retightened after 24-48 hours before taping. Owners' inspector shall be informed of this procedure during the waiting period and shall witness the act of retightening.

C. Feeders and Branch Circuits:

1. Connectors and lugs for terminating stranded conductors sized #8 and larger shall

be machine crimp compression type.

- 2. All splices shall be taped with Scotch "Super 88" vinyl electrical tape, and "Scotch Fill" tape putty where necessary for a smooth joint. For other than normal temperatures or conditions, Scotch #27 or #2520 shall be used.
- 3. No splices shall be made below grade in a manhole or pull holes without the Engineer's written approval. When approved, these shall be encapsulated with 3M potting kits per 3M Specifications.
- 4. Wires in panels, cabinets, pullboxes and wiring gutters shall be squared, labeled, and neatly grouped with Ty-raps and fanned out to the terminals.
- 5. Support all conductors in hand holes/manholes and label with plastic rope. Tag all conductors with plastic waterproof tags.

3.04 WIRING DEVICES:

- A. Wiring devices shall be securely fastened to the outlet box. Where the outlet box covers are back from the finished walls, the device shall be built-out with washers so that it is rigidly held in place to the box. Provide metal extenders in flammable construction per CEC.
- B. All device screw slots shall be left in a vertical orientation.

3.05 OUTLET BOXES:

- A. Boxes shall be securely fastened in position to the ceiling or walls with screws or bolts.

 Nails are not acceptable. The Contractor shall set and align all equipment, level, bolt down, or otherwise secure in place. No back-to-back or through-boxes shall be used.
- B. Boxes shall be accurately located and set square and true with exposed edges of a box or plaster ring flush with finished surface of walls or ceiling. All unused boxes shall be equipped with blank covers that shall match existing covers.
- C. Boxes shall have no unused openings.
- D. Boxes shall be cleaned of all direct plaster, etc., before conductors are installed. Rust spots shall be scraped to bare metal and painted with Rust-Oleum "Cold Galvanizing Compound".
- E. Suspended fixture outlets shall be equipped with 3/8" fixture mounting stud bolted to wood backing or metal studs to safely support fixture weight.
- F. Make any change in outlet location necessary to all job conditions and rearrange fixtures and equipment as directed.
- G. Study all Plans as to relation of spaces surrounding outlets so that this work may be installed at the proper time with others. Fixtures and equipment shall be symmetrically located. Conflicts and discrepancies shall be referred to the Architect immediately and

prior to box installation.

3.06 JUNCTION AND PULL BOXES AND WIREWAYS:

- A. Boxes shall be installed square and plumb. An engraved nameplate shall be installed indicating the function of each box on the exterior in unfinished areas and on the interior in finished areas. Permanent markers are not acceptable.
- B. Pullboxes and wireways shall be concealed or installed flush in finished areas. They shall be surface mounted in machine rooms or unfinished areas.

3.07 TERMINAL CABINETS AND CLOSETS:

A. Install, level, and identify per schedule.

3.08 FLOOR BOXES AND PEDESTALS:

- A. Floor boxes are to be installed level and plumb. Fill with paper prior to pouring concrete. Re-level after concrete has set, then raise to accommodate the floor finish. Core drill for poke through type.
- B. The installation of pedestals shall be coordinated with cabinet work.

3.09 IDENTIFICATION

A. Conductors:

- 1. All power and low voltage systems conductors and cabling shall be identified in accordance with the following schedule:
 - a. 120/208 Volts, 3-phase, 4-wire Wye: Red-Black-Blue, Neutral White
 - b. 120/240 Volts, 3-phase, 4-wire Delta: Black-Blue for single-phase, Orange for 3-phase stinger, Neutral White
 - c. 480/277 Volts, 3-phase, 4-wire Wye: Yellow-Brown-Orange-, Neutral Grey
 - d. Bond or grounding conductor (GWG): Green
 - e. Special system conductors shall be color coded and labeled
- 2. Brady Labels shall be used to identify terminals and destination of feeders, branch circuits, signal and control circuits, etc., at all terminations and junction boxes and shall be coordinated with the nameplates in all boxes and equipment.
- 3. All terminals in the switchboards, panels, relays, switches, devices, starter terminals, etc., shall have Brady Labels for identification to identify both ends of all wiring. Wires #8 and smaller to be terminated on terminal strips squared-type 9080K with white marking strip and screw lugs for wire size.

- B. <u>Nameplates:</u> The Contractor shall furnish and install 1" x 3" x 3/32" thick laminated black Nylon nameplates with a white core, unless specifically shown as red with a white core, engraved to produce white letters on black background for all items of electrical equipment including 2-pole and 3-pole circuit breakers, panelboards, starters, relays, time switches and disconnect switches. The plates shall screwed in place with stainless steel screws. Adhesive backed plates are not acceptable.
- C. <u>Panels</u>: Panels having single-pole circuit breakers shall be provided with typed schedules mounted in welded metal holders behind plastic.
- D. <u>Devices</u>: All devices shall have their branch circuit identified on the back side of device plate with a permanent type black marker, i.e., CKT A-21.

3.10 SUPPORTS AND ANCHORS:

- A. Provide inserts, anchors, supports, rods, brackets and miscellaneous items to adequately support and secure the electrical systems and equipment.
- B. Secure hangers, brackets, conduit straps, supports and electrical equipment to surfaces by means of toggle bolts on hollow masonry. Utilize expansion shields and machine screws or standard preset inserts on concrete or solid masonry. Utilize machine screws or bolts on metal surfaces. Utilize wood screws on wood construction. Wood, fiber plugs, or concrete nails are not acceptable.
- C. Power or velocity driven inserts may not be used for any anchorage <u>unless specifically approved</u> by the Engineer and where the use does not affect the finished appearance of work. <u>Under no circumstance shall these be used in pre-stressed slabs, beams, purlins, or precast members in tension.</u>
- D. Seismic Requirements: Provide vertical and lateral supporting equipment to resist the application of seismic forces per California Code of Regulations, Title 24 Chapter 23.

END OF SECTION

SECTION 26 05 26 - GROUNDING

PART 1 – GENERAL

1.01 DESCRIPTION:

A. Work Included:

1. Provide and install a grounding system as specified and indicated.

B. Related Work:

- 1. See related Sections for their system grounding requirements.
- 2. Basic Electrical Requirements: Section 260000.
- 3. Common Work Results for Electrical: Section 260500.

1.02 SYSTEM REQUIREMENT:

- A. Grounding shall be as approved by the State of California, Division of Industrial Safety.
- B. Electrical continuity to ground for metal raceways and enclosures, which are isolated from the equipment ground by use of non-metallic conduit or fittings, shall be provided with a Code sized green insulated grounding conductor within each raceway connected to the isolated metallic raceways or enclosures at each end. Each flexible conduit shall be provided with a green insulated grounding conductor of Code approved size.
- C. Cold water or other utility piping systems shall not be used as the main system grounding electrodes due to the possible use of insulating couplings and nonmetallic pipe in such installations. All grounding electrodes shall be made electrodes as indicated on the drawings. Within every building the panels shall be bonded to a 1" or larger underground cold water service line with minimum 1" conduit, and one No. 6 wire. All metallic piping systems (gas, fire sprinkler) shall be bonded to the cold-water line with 3/4" conduit with one No. 8 wire.
- D. Non-current carrying metal parts of all high voltage, light and/or power, communications, control, and signal conduit systems, supports, cabinets, switchboards, enclosures, fixed equipment, portable equipment, and motor frames shall be permanently and effectively grounded.
- E. Service neutral conductors of light and/or power alternating current systems shall be grounded as indicated on the drawings and as required by the Utility Company.
- F. Secondary neutral conductors of all light, power and signal alternating current systems shall be grounded.
- G. Provide a "made electrode" bonded to the equipment enclosure at each separate building, including portable buildings, for each light and/or power system. Grounded (neutral) conductors shall be terminated at the neutral bus of the first panel or switchboard encountered within the building, and the neutral bus, equipment enclosure and "made electrode" shall be bonded together.

1.03 SUBMITTALS:

Submit a material list in accordance with Section 013300.

PART 2 – PRODUCTS

2.01 MATERIALS:

- A. Yard boxes for "made electrodes" shall be precast concrete as detailed on the drawings. Boxes shall be equipped with bolted down, checkered, cast iron covers and a cast iron frame cast into the box. Yard boxes shall be Brooks 36 or approved manufacturer.
- B. "Made electrodes" shall be approved copper clad steel ground rods, minimum 3/4" diameter 10' 0" long or a copper "Ufer □ conductor encased in the concrete building foundation as indicated on the drawings.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Grounding "made electrode" rods shall be located in the nearest usable planting area, where not otherwise indicated on the drawings, and each electrode shall terminate within a concrete yard box installed flush with finish grade. In planting areas, concrete yard box shall be 2" above planting surfaces.
- B. Rods shall be driven to a depth of not less than 10'-0". Electrodes shall have a resistance to ground of not more than 25 ohms if practicable. If the resistance exceeds 25 ohms, two or more electrodes connected in parallel shall be provided. The minimum number and size of ground rods shall be as required by State Electrical Safety Orders. Electrodes shall be separated from one another by not less than 6' 0". Parallel electrodes shall be connected together with approved fittings and approved grounding conductors in galvanized rigid steel conduit, buried not less than 12" below finish grade.
- C. The grounding resistance shall be tested by an approved independent testing laboratory in the presence of the DSA Inspector. The test results shall be submitted to the District Maintenance Supervisor on an official form for file with copies distributed to the District Inspector and Electrical

 Consulting

 Engineer.

END OF SECTION

SECTION 26 05 53 - ELECTRICAL IDENTIFICATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General Section 00700 and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. This Section includes identification of electrical materials, equipment, and installations.

1.3 SUBMITTALS:

- A. General: Submit each item in this Paragraph according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified.
- C. Schedule of identification nomenclature to be used for identification signs and labels.
- D. Samples for each color, lettering style, and other graphic representation required for identification materials; samples of labels and signs.

1.4 QUALITY ASSURANCE:

- A. Comply with California Electrical Code.
- B. Comply with ANSI C2.

1.5 SEQUENCING AND SCHEDULING:

- A. Coordinate installing electrical identification after completion of finishing where identification is applied to field-finished surfaces.
- B. Coordinate installing electrical identifying devices and markings prior to installing acoustical ceilings and similar finishes that conceal such items.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Brady USA, Inc.; Industrial Products Division.
 - 2. Carlton Industries, Inc.

- 3. Cole-Flex Corp.
- 4. EMED Co., Inc.
- 5. Ideal Industries, Inc.
- 6. Panduit Corp.

2.2 RACEWAY AND CABLE LABELS

- A. Manufacturer's Standard Products: Where more than one type is listed for a specified application, selection is Installer's option, but provide single type for each application category. Use colors prescribed by ANSI A13.1, California Electrical Code, and these Specifications.
- B. Conform to ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each raceway or cable size.
 - 1. Color: Black legend on orange field.
 - 2. Legend: Indicates voltage and services.
- C. Adhesive Labels: Preprinted, flexible, self-adhesive vinyl. Legend is over-laminated with a clear, weather- and chemical-resistant coating.
- D. Pretensioned, Wraparound Plastic Sleeves: Flexible, preprinted, color-coded, acrylic bands sized to suit the diameter of the line it identifies and arranged to stay in place by pretensioned gripping action when placed in position.
- E. Colored Adhesive Tape: Self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide (0.08 mm thick by 25 to 51 mm wide).
- F. Underground Line Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape with the following features:
 - 1. Size: Not less than 6 inches wide by 4 mils thick (152 mm wide by 0.102 mm thick).
 - 2. Compounded for permanent direct-burial service.
 - 3. Embedded continuous metallic strip or core.
 - 4. Printed Legend: Indicates type of underground line.
- G. Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
- H. Aluminum, Wraparound Marker Bands: Bands cut from 0.0140-inch (0.4 mm) thick aluminum sheet, with stamped or embossed legend, and fitted with slots or ears for permanently securing around wire or cable jacket or around groups of conductors.
- I. Plasticized Card-Stock Tags: Vinyl cloth with preprinted and field-printed legends. Orange background, except as otherwise indicated, with eyelet for fastener.
- J. Aluminum-Faced Card-Stock Tags: Weather-resistant, 18-point minimum card stock faced on both sides with embossable aluminum sheet, 0.002 inch (0.05 mm) thick, laminated with moisture-resistant acrylic adhesive, and punched for the fastener. Preprinted legends suit each application.

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

2.3 ENGRAVED NAMEPLATES AND SIGNS:

- A. Manufacturer's Standard Products: Where more than one type is listed for a specified application, selection is Installer's option, but provide single type for each application category. Use colors prescribed by ANSI A13.1, California Electrical Code, and these Specifications.
- B. Engraving stock, melamine plastic laminate, 1/16-inch (1.6 mm) minimum thick for signs up to 20 sq. in. (129 sq. cm), 1/8-inch (3.2 mm) thick for larger sizes.
 - 1. Engraved Legend: Black letters on white face.
 - 2. Punched for mechanical fasteners.
- C. Baked-Enamel Signs for Interior Use: Preprinted aluminum signs, punched for fasteners, with colors, legend, and size as indicated or as otherwise required for the application. 1/4-inch (6.4 mm) grommets in corners for mounting.
- D. Exterior, Metal-Backed, Butyrate Signs: Weather-resistant, nonfading, preprinted, cellulose acetate butyrate signs with 0.0396 inch (1 mm) galvanized steel backing, with colors, legend, and size appropriate to the application. 1/4-inch (6.4 mm) grommets in corners for mounting.
- E. Fasteners for Plastic-Laminated and Metal Signs: Self-tapping stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

2.4 MISCELLANEOUS IDENTIFICATION PRODUCTS:

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

PART 3 – EXECUTION

3.1 INSTALLATION:

- A. Install identification devices according to manufacturer's written instructions.
- B. Install labels where indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.
- C. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations used in the

Contract Documents or required by codes and standards. Use consistent designations throughout the Project.

- D. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.
- E. Self-Adhesive Identification Products: Clean surfaces of dust, loose material, and oily films before applying.
- F. Install painted identification as follows:
 - 1. Clean surfaces of dust, loose material, and oily films before painting.
 - 2. Prime Surfaces: For galvanized metal, use single-component, acrylic vehicle coating formulated for galvanized surfaces. For concrete masonry units, use heavy-duty, acrylic-resin block filler. For concrete surfaces, use clear, alkali-resistant, alkyd binder-type sealer.
 - 3. Apply one intermediate and one finish coat of silicone alkyd enamel.
 - 4. Apply primer and finish materials according to manufacturer's instructions.
- G. Identify Raceways and Exposed Cables of Certain Systems with Color Banding: Band exposed and accessible raceways of the systems listed below for identification.
- 1. Bands: Pretensioned, snap-around, colored plastic sleeves; colored adhesive tape; or a combination of both. Make each color band 2 inches (51 mm) wide, complete encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
- 2. Locate bands at changes in direction, at penetrations of walls and floors, at 50- foot (15 m) maximum intervals in straight runs, and at 25 feet (7.6 m) in congested areas.
- 3. Colors—as follows:
 - a. Fire-Alarm System: Red.
 - b. Fire-Suppression Supervisory and Control System: Red and yellow.
 - c. Combined Fire-Alarm and Security System: Red and blue.
 - d. Security System: Blue and yellow.
 - e. Mechanical and Electrical Supervisory System: Green and blue.
 - f. Telecommunications System: Green and yellow.
- H. Install Circuit Identification Labels on Boxes: Label externally as follows:
 - 1. Exposed Boxes: Pressure-sensitive, self-adhesive plastic label on cover.
 - 2. Concealed Boxes: Plasticized card-stock tags.
 - 3. Labeling Legend: Permanent, waterproof listing of panel and circuit number or equivalent.
- I. Identify Paths of Underground Electrical Lines: During trench backfilling, for exterior underground power, control, signal, and communications lines, install continuous underground plastic line marker located directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Where multiple lines installed in a common trench or concrete envelop, do not exceed an overall width of 16 inches (400 mm); use a single line marker.
 - 1. Limit use of line markers to direct-buried cables.
 - 2. Install line marker for underground wiring, both direct buried and in raceway.
- J. Color-Code Conductors: Secondary service, feeder, and branch circuit conductors throughout the secondary electrical system.

- 1. 208/120-V System--as follows:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - d. Neutral: White.
 - e. Ground: Green.
- 2. 480/277-V System--as follows:
 - a. Phase A: Brown.
 - b. Phase B: Orange.
 - c. Phase C: Yellow.
 - d. Neutral: Grey.
 - e. Ground: Green.
- 3. Factory-apply color the entire length of the conductors, except the following field-applied, color-coding methods may be used in lieu of factory-coded wire for sizes larger than No. 10 AWG
 - a. Colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps or made. Apply the last two turns of tape with no tension to prevent possible unwinding. Use 1-inch (25 mm) wide tape in colors as specified. Adjust tape bands to avoid obscuring cable identification markings.
 - b. Colored cable ties applied in groups of 3 ties of specified color to each wire at each terminal or splice point starting 3 inches (76 mm) from the terminal and spaced 3 inches (76 mm) apart. Apply with a special tool or pliers, tighten to a snug fit, and cut off excess length.
- 4. For all system voltages:
 - a. Isolated ground conductors: Green with yellow stripe.
 - b. Mark with a 1" band of green tape, followed by a 1" band of yellow tape, followed by a 1" band of green tape.
- K. Power Circuit Identification: Use metal tags or aluminum wraparound marker bands for cables, feeders, and power circuits in vaults, pull boxes, junction boxes, manholes, and switchboard rooms.
 - 1. Legend: 1/4 inch (6.4 mm) steel letter and number stamping embossing with legend corresponding to indicated circuit designations.
 - 2. Fasten tags with nylon cable ties; fasten bands using integral ears.
- L. Apply identification to conductors as follows:
 - 1. Conductors to be extended in the future: Indicate source and circuit numbers.
 - 2. Multiple power or lighting circuits in the same enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color-coding for voltage and phase indication of secondary circuit.
 - 3. Multiple control communications circuits in the same enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color-coding, or cable marking tape.
- M. Apply warning, caution, and instruction signs and stencils as follows:
 - 1. Install warning, caution, and instruction signs where indicated or required to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved, plastic-laminated instruction signs with approved legend

- where instructions or explanations are needed for system or equipment operation. Install butyrate signs with metal backing for outdoor items.
- 2. Emergency-Operating Signs: Install engraved laminate signs with white legend on red background with minimum 3/8 inch (9 mm) high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

N. Install Identification as follows:

- 1. Apply equipment identification labels of engraved plastic laminate on each major unit of equipment, including central or master unit of each system. This includes communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Except as otherwise indicated, provide a single line of text with 1/2 inch (13 mm) high lettering on a 1 1/2 inch (38 mm) high label; where two lines of text are required, use lettering 2 inches (51 mm) high. Use white lettering on black field. Apply labels for each unit of the following categories of equipment.
 - a. Panel boards, electrical cabinets, and enclosures.
 - b. Access doors and panels for concealed electrical items.
 - c. Electrical switchgear and switchboards.
 - e. Motor control centers.
 - f. Motor starters.
 - q. Push-button stations.
 - h. Contactors.
 - i. Remote-controlled switches.
 - i. Dimmers.
 - k. Control devices.
 - I. Transformers.
 - m. Telephone switching equipment.
 - n. Clock/program master equipment.
 - o. TV/audio monitoring master station.
 - p. Fire-alarm master station or control panel.
 - q. Security-monitoring master station or control panel.
- 2. Apply designation labels of engraved plastic laminate for disconnect switches, breakers, push-buttons, pilot lights, motor control centers, and similar items for power distribution and control components above, except panel boards and alarm/signal components where labeling is specified elsewhere. For panel boards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker.

END OF SECTION

SECTION 26 40 00 – LOW VOLTAGE ELECTRICAL TRANSMISSION

PART 1 – GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- B. Section 26 05 00 Basic Materials and Methods section and other Division 26 sections apply to work specified in this section.

1.02 SCOPE:

- A. Work included: Furnishing and installation of a complete electrical service, distribution, and grounding system. Conditions of this section apply to all other 26 40 00 series sections included.
- B. Related Work: Refer to other sections, particularly those listed below, so as to properly coordinate work specified herein with that specified elsewhere to produce a finished, workmanlike, fully functioning installation.
- C. All other Electrical Sections: Division 26

1.03 QUALITY ASSURANCE:

See Section 26 05 00.

1.04 SUBMITTAL:

- A. Product Data: Submit manufacturer's data on service entrance equipment, switchboards, motor control centers and/or individual starters, transformers, panelboards, disconnect switches and grounding components.
- B. Trip Curves: When requested, submit trip timing curves for all circuit interrupting devices.
- C. Nameplate Schedule: Submit nameplate schedule for approval.

1.05 COMPONENT COORDINATION:

In order to maintain close control and coordinate the various components of the distribution systems, the number of manufacturers shall be kept to a minimum. Equipment manufacturer shall be General Electric or Square D. It shall be the manufacturer's responsibility through the Electrical Contractor to coordinate all components of the system in order to ensure systems that will provide maximum protection of equipment and reliable safe operation.

1.06 NAMEPLATES:

Laminated phenolic plastic, color coded black for 120/208 volt equipment, with white letters. Provide for identification of each transformer, panelboard and motor control center, secure to face with two (2) chrome plated screws each. A schedule of nameplates shall be included with the shop drawings for approval.

1.07 FEEDER CONNECTIONS:

Provide cast, saddle type bolted lugs or hydraulically set compression lugs for all bus connections. Manufacturer shall be Thomas and Betts, Burndy, O.Z. or approved equal. Lugs in which the set of screw embeds directly into feeder conductor shall not be used.

1.08 MISCELLANEOUS:

- A. Equipment Bases: Provide appropriately sized concrete housekeeping bases for all floormounted equipment.
- B. Hoisting Lifting Lugs: Provide on all heavy equipment as required to ensure safe hoisting.
- C. Space for Future Protective Device: Provide as indicated on drawings; shall be completely equipped for the future addition of a circuit breaker or fused switch, including all connections.

PART 2 – PRODUCTS

2.01 PANELBOARDS:

- A. Panelboards shall be Bolt-down Circuit Breaker type, with voltage, phase, and breakers as specified in panelboard schedules. Panelboards shall be installed flush or surface or specified, at locations as indicated on plans. Panelboards shall be installed in code gauge rust proof steel cabinets with flush door having flush locks all keyed alike and with trim cut square and true.
 - 1. Panelboards: General Electric A-Series and Spectra Series; Square D, type I-Line, NQ, NQOB, and NF; or approved equal.
- B. All panelboards and breakers shall meet the requirements of the indicated available symmetrical short circuit current or have a minimum bus bracing to meet figure shown.
- C. All interiors shall be completely factory assembled. They shall be so designed that switching and protective devices can be replaced without disturbing adjacent units and without removing the main bus connectors, so that circuits may be changed without machining, drilling or tapping.
- D. Branch circuits shall be arranged using double row construction except when narrow column panels are indicated. A nameplate shall be provided listing panel type and ratings.

- E. Unless otherwise noted, full size insulated neutral bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices. Neutral bussing shall have a suitable lug or each outgoing feeder requiring a neutral connection. A ground bus will be included in all panels.
- F. Boxes shall be at least 20 inches wide made from galvanized steel. Provided minimum gutter space in accordance with California Electric Code. Where feeder cables supplying the mains of a panel are carried through its box to supply other electrical equipment, the box shall be sized to include the additional required wiring space. At least four interior mounting studs with adjustable nuts shall be provided.
- G. Door hinges shall be concealed. All locks shall be flush, stainless steel, cylinder tumbler type locks with catches and spring loaded door pulls, keyed alike and directory frame and card having a transparent cover shall be furnished with each door.
- H. All exterior and interior steel surfaces of the trim shall be properly cleaned, primed with a rust inhibiting phosphatized coating and finish with a gray ANSI 61 paint. Trims for flush panels shall overlap the box for at least 3/4 inch all around. Surface trims shall have the same width and height as the box. Trims shall be mountable by a screwdriver without the need for special tools. After installation, trim clamps shall not be accessible when the panel door is closed and locked.
- I. All main bus bars shall be cooper or tin plated aluminum sized in accordance with UL standards to limit the temperature rise on any current carrying part to a maximum of 50 degrees C above an ambient of 40 degrees C maximum.
- J. Circuit breakers shall be quick-make, quick-break, thermal-magnetic, trip indicating, and have common trip on all multipole breakers. (Trip indication shall be clearly shown by the breaker handle taking position between ON and OFF when the breaker is tripped). Branch circuit breakers feeding convenience outlets shall have sensitive instantaneous trip settings of not more than 10 times the trip rating of the breaker to prevent repeated arcing shorts resulting from frayed appliance cords. Single pole 15 and 20 ampere circuit breakers shall be UL listed as "Switching Breakers" and carry the SWD marking. UL Class A (5 milliampere sensitivity) ground fault circuit protection shall be provided on 120V ac branch circuits as specified on the plans or panel board schedule. protection shall be an integral part of the branch circuit breaker which also provided overload and short circuit protection for branch circuit wiring. Tripping of a branch circuit breaker containing ground fault circuit interruption shall not disturb the feeder circuit to the panelboard. A single pole breaker containing ground fault circuit interruption shall not disturb the feeder circuit to the panelboard. A single pole circuit breaker with integral ground fault circuit interruption shall require no more panelboard branch circuit space than a conventional slide pole circuit breaker. Connections to the bus shall be bolt on.

2.04 DISCONNECTS:

- A. Motor and circuit disconnects shall have an Underwriters' Laboratory label.
- B. Disconnect switches shall be suitable for area where they are installed, i.e., weatherproof,

and shall be rated heavy duty. Use only 600 volt class with proper number of poles. Switches shall be fused unless indicated on plans. Fuses shall be of type specified on plans.

C. When a disconnect switch is not clearly visible from the control location, provide an operating handle which is lockable in the open position.

2.05 GROUNDING:

- A. Clamps, bonds, etc. suitable and as necessary to provide continuous ground system.
- B. Ground Rods: "Copperweld" 3/4" diameter, 10' long.
- C. All grounding conductors shall be copper, sizes not less than that required under CEC Table 250.122.
- D. All grounding electrode conductors shall be copper, sizes not less than that required under CEC Table 260.66.

2.06 SWITCHBOARDS:

A. Manufacturer's: Subject to compliance with requirements, provide switchboards of one of the following:

General Electric Company Square D Company

- B. General: Except as otherwise indicated, provide switchboards of types, sizes, characteristics, and ratings indicated, which comply with manufacturer's standard design, materials, components, and construction in accordance with published product information, and as required for complete installation. Service entrance switchboards shall comply with serving utility requirements.
- C. AC Dead-Front Distribution Switchboards: Provide factory assembled, dead-front, metal enclosed, self-supporting secondary power switchboards, of types, sizes and electrical ratings and characteristics indicated; consisting of panel (vertical) units, and containing circuit breakers of quantities, ratings and types indicated. Provide copper or tin plated aluminum main bus and connections to switching devices of sufficient capacity to limit rated continuous operating temperature rise to 54 degrees F, and 90 degrees F for circuit breaker branches; with main bus and tap connections silver-surfaced and tightly bolted for maximum conductivity. Brace bus for short circuit stresses up to maximum interrupting capacity. Prime and paint switchboard with manufacturer's finish and color. Construct units for outdoor, NEMA Type 3R.
- D. Enclosures: Construct dead-front switchboards, suitable for floor mounting, with front cable/wire and conduit accessibility as indicated. Provide welded steel channel framework, hinge wireway front covers to permit ready access to branch circuit breaker load slide terminals. Coat enclosures with manufacturer's standard corrosive resistant finish.

E. Bussing: Provide switchboard with sufficient cross-sectional area to fulfill U.L. Standard 891 pertaining to temperature rise.

2.06 MOTOR STARTERS (When used):

- A. Manual motor starters to be quick-make, quick break, with overload protection. General Electric cr 101, or Square D equivalent, for 120/240 volt 1 hp or less.
- B. Magnetic motor starters shall be across the line unless indicated with control power transformer (120 volt coil) and with overload relay protection. Combination type shall have integral fused switch or circuit breaker as indicated.

2.07 TRANSFORMERS:

- A. Transformers, Dry Type: Distribution transformers shall be constructed and tested in accordance with ASA and NEMA Standards, TP-1 minimum, and shall be wound with copper or aluminum conductors. Performance of transformers shall be equal to or exceed ASA and NEMA published criteria.
- B. Transformers shall be self-cooled type with Class H, NEMA, Group 111 insulation and a temperature rise of 150°C under continuous full load conditions with an ambient of 400°C.
- C. Transformers supplying voltage to wave altering devices (computers, electronic ballasts, etc.) shall be K4 rated minimum, or as noted otherwise on plans.
- D. Transformers shall be equipped with four 2-1/2% taps (2 taps above and 2 taps below normal voltage). Windings shall be of the fire-resistant type, designed for natural convection cooling through normal air circulation.
- E. Core mounting frames and enclosures shall be of welded and bolted construction with sufficient mechanical strength and rigidity to withstand shipping, erection and short circuit stresses.
- F. Enclosure cover plates shall be Code gauge sheet steel, captive bolted to the enclosure framework. Enclosure shall have suitable ventilating openings with rodent-proof screens. Enclosure shall be provided with lifting lugs and jacking plates as required.
- G. Transformers shall be furnished complete with mounting channels and mounting bolts. Metal parts, except cores and core mounting frames, shall be cleaned, rust-proofed and given a heavy coating of an inert primer.
- H. Transformers used indoors shall be "low noise." They shall be provided with vibration dampers. Size and number of shock mounts shall be in accordance with manufacturer's recommendations.
- I. Transformers shall be manufactured by General Electric, Square D, or approved equal.

PART 3 – EXECUTION

3.01 INSTALLATION OF SWITCHGEAR AND SWITCHBOARDS:

- A. Install switchgear and switchboards as indicated, in accordance with manufacturer's written instruction, and with recognized industry practices to ensure that switchboards comply with requirements of NEMA and CEC standards, and applicable portions of NECA's "Standard of Installation".
- B. Prior to energization of circuitry, check all accessible connections to manufacturer's torque specifications. Subsequent to wire and cable hook-ups, energize switchboards and demonstrate functioning in accordance with requirements.

3.02 INSTALLATION OF PANELBOARDS:

- A. Provide mounting brackets, busbar drilling, and filler pieces for unused spaces.
- B. Branch circuits shall be connected as shown in line diagrams and/or panelboard schedules, with wires neatly tie wrapped in panel.
- C. All distribution panelboards shall have all sub feeders and main breakers marked with 1" x 3" plastic name tags secured with two self-tapping screws.
- D. All panelboards shall be provided with a 2" x 3-1/2" plastic name tag on the front of the panel door or on the trim, indicating panel designation and distribution panel and circuit feeding above panel, secured with two self-tapping screws.
- E. Branch circuit panelboards shall have a plastic covered circuit directory card on the inside of each door with all circuit destinations neatly typed.
- F. Contractor shall check and tighten all factory made wire or lug connections. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standard 486A.
- G. Install four (4) spare 3/4" conduits from all panelboards to accessible ceiling space.

3.03 INSTALLATION OF DISCONNECTS:

Install disconnects for all equipment and motors of the size required and as recommended by manufacturer.

3.04 INSTALLATION OF GROUNDING:

- A. Scope: Provide grounding system complying with the codes and ordinances specified. Grounding system shall provide continuity through the entire electrical system.
 - 1. Panelboard ground buses.

- 2. PVC conduit or other raceways.
- 3. All motors.
- 4. All lighting fixtures.
- 5. Grounding terminals of all receptacles.
- 6. Miscellaneous grounds required by code.
- B. Equipment and raceway bonding procedures shall be rigidly maintained and meet all jurisdictional requirements of codes and regulations.
- C. Good, electrically continuous, metal to metal contacts shall be made wherever possible at all panel boxes, pull boxes, etc. Where it is not possible to obtain good contacts, the conduit shall be bonded round the boxes with a 6 BS gauge, rubber covered, double braided wire with ground clamps.
- D. A separate grounding conductor shall be run in all conduit runs from distribution, lighting, and power, etc. panelboards, motor control outlets, etc., back to their respective service or distribution panelboards.
- E. Flexible Conduit Grounding: Provide a separate grounding conductor in all flexible conduit runs to include watertight flexible conduit with integral grounding straps. Install ground conductors inside conduit with ungrounded conductors. Extend from nearest panel to device being connected.
- F. Receptacle Circuits: Provide a separate grounding conductor in all receptacle circuit conduit runs, back to serving panelboard.

3.05 INSTALLATION OF MOTOR STARTERS:

- A. In finished areas, mount motor protection switches flush and install suitable cover plates.
- B. Install heaters correlated with full load current of motors provided.
- C. Set overload devices to suit motor provided.

3.06 INSTALLATION OF TRANSFORMERS

- A. Transformer core frame shall be installed level on shock absorbing pads within the enclosure.
- B. Mounting bolts on floor-mounted transformers shall be extended into pads only and shall not be in direct contact with building structural members.
- C. Flexible jumpers shall be installed for grounding continuity from enclosure to conduits.

D. Voltage Check:

- 1. The Contractor shall set the taps on all transformers (which are a part of this contract) as necessary to provide satisfactory operating voltages with all present loads energized. A check shall be made in the presence of the District Inspector at a panel fed from each transformer and which is the farthest from the transformer. Voltages at the transformers ranging from 118 to 122 volts inclusive, for 120-volt systems and proportionately equivalent for higher voltage systems, are acceptable.
- 2. The Contractor shall provide all instruments and accessories required to perform the checks. Volt meters shall be accurate within 1% and shall have scales permitting the voltage readings to be made on the upper half of the scale.

END OF SECTION

SECTION 26 50 00 - LIGHTING FIXTURES

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Included: Furnish and install lighting fixtures including lamps; connect fixtures to circuits, occupancy sensors, relays, room controllers, contactors, control panels, and gateways, where applicable.

B. Related Work:

- 1. Common Work Results for Electrical: Section 26 05 00.
- 2. Low Voltage Electrical Transmission: Section 26 20 00.

1.02 SUBMITTALS

- A. All submittals shall be made in accordance with Division 1 Submittal Procedures.
- B. List of Materials: Submit a complete list of material proposed for this Section.
- C. Shop Drawings for Lighting Fixtures: Provide detailed and dimensioned working drawings showing kind, weight and thickness of materials, method of fitting and fastening parts together, location and number of sockets, size and color of lamps, and complete details of the method of fitting, suspension and securing the fixtures in place. Drawings shall contain sufficient information to enable a workman to construct and install the fixtures without further instructions.
- D. Shop Drawings for Lighting Controls: Provide manufacturer-detailed and complete wiring diagrams and plans for lighting controls. Provide cut sheets for lighting control devices and cabling.

1.03 MOUNTING REQUIREMENTS

Comply with State of California earthquake requirements and CEC requirements for lighting fixture installations and support.

1.04 GUARANTEE

A. Guarantee lighting components against service failure for five years. Indicate installation date on each driver by inscribing month, day and year on the housing.

PART 2 – PRODUCTS

2.01 MATERIAL AND FABRICATION

A. Each lighting fixture shall be the type indicated on the drawings and as specified herein. Fixtures of the same type shall be of identical make, design and appearance. The size of

- each lighting fixture shall be as specified herein for the lamp or fixture wattage indicated on the drawings.
- B. The design of all lighting fixtures, accessories and supports, as well as the method of hanging fixtures, shall comply with all requirements for earthquake resistant construction of the State of California.

2.02 LIGHT FIXTURES

- A. LED Drivers: Drivers shall be electronic type specifically designed to save energy while maintaining full light output. Drivers shall have "A" sound rating, thermal protectors and guaranteed against service failure for three years. Drivers shall comply with FCC and NEMA limits governing electromagnetic and Radio Frequency Interference and meet all applicable ANSI, State and Federal standards. The contractor shall indicate the installation date on each driver by inscribing the month, day and year on the ballast case. Drivers shall be noiseless, high power factor type and shall be ETL certified under CBM Standards and Underwriters' Laboratory listed.
- B. LED Diodes shall have the following minimum characteristics:
 - 1. Efficacy 100 lumens per watt or greater
 - 2. Color rendition index 80 or greater, unless scheduled otherwise
 - 3. Standard deviation color matching for diodes shall fall within 1 MacAdam ellipse.

2.03 LIGHTING CONTROLS

- A. Lighting controls and control systems shall meet all requirements of the State of California Title 24 energy code.
- B. Lighting control systems shall be commissioned by a factory lighting commissioner. Commissioning by the contractor is not acceptable.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install lighting fixtures where shown on plans.
- B. Fixture voltage shall be as shown on drawings and in the fixture schedule.
- C. Install recessed and surface-mounted fixtures with mounts or plaster frames compatible with the ceiling and wall systems employed and secure fixtures mechanically to frames.
- D. Align rows of surface-mounted fixtures to form straight lines at uniform elevations. Provide factory joiner bands for contiguous fixtures, and end caps on ends.

- E. Recessed fixtures shall fit snugly against ceilings to prevent light leakage.
- F. Support suspended recessed fixtures in a T-bar ceiling as follows: All fixtures shall be attached to the ceiling grid to resist a horizontal force equal to the weight of the fixtures. For heavy duty grid systems, fixtures weighing less than 56 pounds must also have two 12 gauge slack safety wires from diagonal corners to the structure above; fixtures weighing more than 56 pounds shall be independently supported by not less than 4 taut No. 12 gauge wires capable of supporting four times the load. For intermediate duty grid systems, fixtures shall be independently supported by not less than four taut No. 12 gauge wires capable of supporting four times the load. All fixture hanger wire ends shall be twisted three tight turns within a 2" distance. Fixture installation shall be coordinated with the acoustical ceiling installation.

G. Light Pole Installation:

- 1. Set in concrete footings; set poles plumb and straight. Grout and dry-pack after leveling poles. Concrete, grout and dry-pack are specified under Section 03 30 00, Cast-in-Place Concrete.
- 2. Electrically ground the fixtures and poles.
- 3. Solder and tape splices as required for the floodlight fixture installations.
- 4. Each standard shall be tapered galvanized steel, with handhole, anchor bolts, fixture mounting brackets and all accessories.
- 5. Poles shall be designed to withstand a minimum wind velocity of 80 mph sustained, 104 mph gusts.
- H. Provide factory commissioning for lighting controls and devices. The completed installation shall comply in every way with the requirements of Title 24.

3.02 CLEANING

- A. Clean surfaces of all dirt, cement, plaster and other debris. Use cleansers compatible with material surfaces being cleaned.
- B. Clean lenses, reflectors, and the like of dust, fingerprints, and grime.

3.03 TESTING

- A. Check and adjust fixtures for even illumination.
- B. Replace defective fixtures and fixture components with new.
- C. The lighting control system shall be acceptance tested by an independent company. The agent shall not be an employee of or affiliated with the contractor. The contractor is responsible for making any adjustments to pass the acceptance tests.

END OF SECTION

SECTION 2700000 - COMMUNICATIONS

PART 1 – GENERAL

1.1 Related Sections

A. This specification section provides general conditions for all division 27 specifications. All contractors working with in the division 27 specification shall adhere to this specification and these related specifications:

Section 270528 - Communication Infrastructure Systems Section 271000 - Structured Cabling System

1.2 Statement of Work

- A. This document describes the requirements for the contractors, products and installation relating to furnishing and installing Structured Cabling and Communications Systems.
- B. 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.
- C. 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.
- D. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of devices, typical installation details, and mounting details will be provided as an attachment to this document. The successful vendor shall meet or exceed all requirements for the systems described in this document.
- E. Contractors DO NOT remove Owner network equipment without written approval from the Owner.
- 1.3 Existing cabling and systems equipment (when existing systems are in scope)
 - A. Demolition of cabling systems per 2019 CEC:
 - 1. Remove all cabling defined for demolition per CEC 640.2, 640.6.C, 645.2,

- 645.5.F, 725.2, 725.25, 770.2, 770.25, 770.154.A, 800.2, 800.25, 800.154.A, 820.2, 820.25, 820.154, 830.2, 830.25,
- 2. The owner shall be given "first right of refusal" for all decommissioned equipment and removed cable.
- 3. The owner may wish to keep, recycle or destroy these items. If the items are refused by the owner the contractor may keep, recycle or destroy these items.
- 4. Owner will establish a location for all materials it wishes to keep, recycle or destroy.
- B. Contractor SHALL NOT demo any existing analog telephone cables or outlets, except where complete reconstruction occurs. The existing telephone cabling will remain intact and used by the district upon re-occupancy. Contractor shall repair any telephone cabling they damage during this project. Cut cables must be replaced end to end, no splice repairs will be allowed.
- C. Contractor SHALL NOT demo any existing intercom cables or outlets, except where complete reconstruction occurs. The existing intercom cabling will remain intact and used by the district upon re-occupancy. Contractor shall repair any intercom cabling they damage during this project. Cut cables must be replaced end to end, no splice repairs will be allowed.
- D. Contractor SHALL NOT demo any existing coaxial CATV cables or outlets, except where complete reconstruction occurs. The cabling will remain intact and used by the district upon re-occupancy. Contractor shall repair any cabling they damage during this project. Cut cables must be replaced end to end, no splice repairs will be allowed.
- E. Contractor SHALL NOT demo any existing CCTV cables, outlets, or cameras except where complete reconstruction occurs. The existing cabling will remain intact and used by the district upon re-occupancy. Contractor shall repair any cabling they damage during this project. Cut cables must be replaced end to end, no splice repairs will be allowed. Coordinate with Owner for the removal of any cameras in the way of the scope of work. Owner will remove existing cameras.
- F. Contractor to coordinate with the Owner for the scheduled removal of any existing network equipment, such as, but not limited to, wireless access points, access point mounting brackets, network switches, and network routers. All equipment is to removed by Owner and NOT the contractor. Owner will remove and re-install any network equipment unless specifically coordinated with Contractor.

1.4 Regulatory References

A. Contractor will comply will all Federal, State, Local Codes/Regulations and Industries Standards.

1. Federal:

- California Electric Code(CEC) 2019, Chapter 8: "Communications Systems" Article 250: "Grounding"
- FCC Part 15, Part 68

ADA – Americans with Disabilities Act

2. State of California:

- CCR Part 2 California Building Code.
- CCR Part 3 California Electrical Code
- Occupational Safety and Health Act (OSHA).
- Title 24, Building Standards, State of California.
- Title 19, California Code of Regulations.
- Title 8, Electrical Safety, State of California

3. ANSI Standards:

- ANSI C2-2001 National Electrical Safety Code.
- ANSI C80.3 Specification for Zinc-coated Electrical Metallic Tubing.
- ANSI/UL 797 Electrical Metallic Tubing.
- ANSI/ICEA S-83-596-2001 Fiber Optic Premises Distribution Cable Technical Requirements.

4. Industry Standards:

•	Telecommunications Industry Associations/Electronics Industry Association
	(TIA/EIA)

(TIA/EIA)		
TIA/EIA-568.0-D	Commercial Building Telecommunications Cabling	
	Standard	
TIA/EIA-568-1.D	General Requirements	
TIA/EIA-568-C.2	Balanced Twisted Pair Cabling Components Standard	
TIA/EIA-568-3-D	Optical Fiber Cabling Components Standard	
TIA/EIA-569-A	Commercial Building Standard for Telecom Pathways	
	and Spaces	
TIA/EIA-606	Administration Standard for the Telecommunications	
	Infrastructure of Commercial Buildings	
TIA/EIA-607	Commercial Building Grounding/Bonding	
	Requirements	
TIA/EIA-758	Customer-Owned Outside Plant Telecommunications	

Addendum No. 1 to TIA/EIA-758, Customer-Owned TIA/EIA-758-1

Outside Plant Telecommunications Cabling Standard

National Electrical Manufacturer's Association (NEMA)

Cabling Standard

Institute of Electrical and Electronic Engineers (IEEE) 802.3 (Ethernet)

802.3ab (Gigabit Ethernet over 4-pair Category 5e, 6 & 6A or higher) 802.3Z (Gigabit Ethernet over optical fiber) 802.11ac (Wireless LAN Specifications)

- Underwriters Laboratories Inc. (UL)
- International Organization for Standardization/International Electromagnetic Commission (ISO/IEC) ISO 11801 Generic Cabling for Customer Premises
- (BICSI) Building Industry Consulting Services International Telecommunications Distribution Methods Manual (TDMM 13th Edition or latest).

- ASCII American Standard Code for information Interchange
- ASTM American Society for Testing and Materials
- B. 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.
- C. 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.

1.5 Safety/Contractor Qualifications/Quality Assurance

A. Safety and Indemnity

- 1. The Contractor shall be solely and completely responsible for conditions of the job site, including safety of persons and property during performance of work.
- 2. The Contractor shall ensure that all personnel working in or anywhere on the site shall be provided a hard hat, safety shoes, a face shield or safety goggles, etc. for their protection.
- 3. No act, service, drawing review or construction observance by the owner's representative or any other party employed by the campus is intended to include review or approval of adequacy of the Contractor's safety measures, in, on or near the construction site.

B. Contractor Qualifications

- 1. Each low voltage contractor/sub-contractor shall submit their qualifications to the district prior to award of contracts.
- 2. Contractor shall have been in business for no less than five (5) years and have installed of a minimum of 3 projects of similar size and scope.
- 3. A Manufacturer Certified Installer contractor, currently certified in the Owner's standard solutions, shall complete the System installation. The contractor shall have completed standards-based product and installation training. A copy of the Contractor's Manufacturer Certified Installer certificate shall be submitted with their submittal.

4. Sub-Contractor Qualifications

- All Contractors shall submit a list of at least three (3) projects of similar dollar volume completed within the past 24 months for reference purposes.
- The Contractor shall compile detailed information relating to similar work completed, including corporate references sufficient to enable the Owner to evaluate and agree to the Contractors' responsibility, experience and capacity to perform the work.
- Each Contractor to perform telecommunications work on this project shall possess a C-10 or C-7 (formerly C-61) Limited Specialty License for Telecommunications and must be certified for the installation, termination,

- splicing, and testing of copper cables, fiber optic cable, riser cable, and inside wiring. The appropriate contractor's license for underground construction and conduit installation is also required.
- An on-site Contractor superintendent must be available at all times. Contact can be by person or telephone.
- 5. Contractors who do not meet the minimum specified requirements will not be accepted.

C. Quality Assurance

Contractors 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.
 - 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.
 - Project Manager will be required to be available for scheduled on site project meetings at no additional cost to the Owner.
 - 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 shall 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.
 - "New" Materials and products shall be manufactured within one (1) year
 prior to installation and meet or exceed the latest published specifications of
 the manufacturer. 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 must warranty all materials, equipment and labor for a minimum of one (1) year from the Owner's acceptance of the work.
 - 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.).
 - 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.
 - 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.
- 4. Contractor must submit for full manufacturer extended warranty upon

completion of the project. Warranty certificate to be sent directly to Owner.

1.6 Submittal Documentation

- A. The successful contractor shall provide their submittal package in accordance with the Section 01 20 00 1.06 Submittal Schedule
- B. The successful contractor shall provide three (3) copies of their submittal package.
- C. The Submittal Package will include:
 - 1. All documentation given will be in a Bond Cover or in a Three (3) Ring Binder.
 - 2. A coversheet on the Contractor's Company Letterhead including:
 - Contractor's Name
 - Contractor's License Number
 - The Project Name
 - The Specification Number and Description
 - The date documentation was submitted.
 - 3. A spreadsheet with a full material list of products and equipment included in the Contractor's bid price. Spreadsheet will provide:
 - Manufacture Name
 - Part Number
 - Description
 - Quantity to be installed for each part.
 - 4. A legible copy of the Manufacturer's Catalog Cut sheet for each part included in the Contractor's bid.
 - The Catalog Cut sheets shall be placed in the same order as shown on the spreadsheet.
 - 5. Copies of the Manufacturer's Certification for a minimum of the Project Forman and 50% of the installation crew.
 - 6. Sample of Labeling Scheme. Contractor will provide a sample for each identifier to be used on this project. Labels are to be approved by Owner prior to printing.
- D. LEED/CHIPS/HPSA (when applicable to project provide additional submittal information)
 - 1. Recycled content, segregated by pre- and post-consumer percentages.
 - 2. Rapidly renewable material content.
 - 3. VOC content
 - 4. Distances from site to follow material process locations.
 - Raw material harvest, collection or extraction
 - Product or component fabrication

• Final material manufacture, if different than component fabrication

1.7 Equivalent Products

- A. Pre-Approved Equals:
 - 1. All pre-approved products shall be listed in the relevant specification section.
- B. Contractors wishing to approve a system other than those specified in this document will be required to perform the following:
 - Provide System specifications and cut sheets for all system components for the proposed new system(s).
 - 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 5 business 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.
- 1.8 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.

1.9 Acceptance and Warranties

A. Project Acceptance

- 1. The Owner and the Contractor shall accept the project as complete based on the following criteria:
 - Before executing any performance testing, the Contractor shall present a test plan to the Project Engineer for their approval.
 - The Contractor has completed all testing and delivered copies of all test results to the owner's representative.
 - All test results have been examined and approved by the Contractor and the Project Engineer.
 - Copies of all documentation required by this section have been delivered to the Project Engineer.
 - All punch list items are completed to the satisfaction of the Inspector-of-Record.
 - Manufacturer Warranty Certification Certificates are provided to the Owner.

- 2. Following completion and/or compliance with the requirements listed above, the Contractor shall issue a Notice of Completion confirming that the project is complete. A 45-day acceptance period shall begin immediately following the issuance of the Notice of Completion.
- 3. Minor failures shall be responded to at the Owner's discretion or within one business day.

B. Manufacturer Warranties

- 1. The installed 271000 structured wiring (as applicable for given cable media) system, including both inter-building and intra-building sub-systems, shall be warranted by a manufacturer for a 15-year period or greater. Lifetime warranty is the warranty period preferred by the Owner and will be given preference where applicable.
- 2. The warranty certified systems will be a complete system comprised of products from a single solution manufacturer, warranted to operate as a guaranteed system for the entire channel (cords, telecommunications outlet/connectors, cables, cross-connects, patch panels, etc.). The Solution Manufacturer shall administer a follow-on program through the Vendor to provide support and service to the purchaser, and a single extended warranty point of contact. In the event that the certified system ceases to support the certified application(s), whether at the time of cutover, during normal use or when upgrading, the manufacturer and vendor shall commit to promptly implement corrective action.
- 3. The Contractor shall be responsible for correcting any problems and malfunctions that are warranty-related for the entire warranty period. In the event that a Contractor should not be in business at the time of an issue, the manufacturer shall be responsible for all corrections, if deemed the responsible party.
- 4. Copies of any extended material warranties shall be passed through to the Owner.
- 5. During the installation and up to the date of final acceptance, the Contractor shall protect all finished and unfinished work against damage and loss. In the event of such damage or loss, the Contractor shall replace or repair such work at no cost to the Owner or any other Trade Partnership working on the project.

END OF SECTION

SECTION 270528 – COMMUNICATIONS INFRASTRUCTURE SYSTEM

PART 1 – GENERAL

1.1 Statement of Work

- A. This document describes the requirements for the contractors, products and installation relating to furnishing and installing Underground Ducts and Raceway systems. All systems described herein shall be governed by the Division 16000 specifications, should these two documents be in conflict the more stringent shall prevail.
- B. The locations of vaults and pull boxes on the drawings are approximate and reflect the best information available. The Contractor is responsible for locating all existing utilities within the areas to be excavated prior to excavation. Final location of all trenches, communications utility vaults, and pull boxes must be verified and signed off on by the Owner/Owner's Representative.
- C. The contractor shall furnish and install all work necessary to make compete systems, whether or not such details are mentioned in these specifications or shown on the drawings, but which are necessary in order to complete working systems, excepting those portions that are specifically mentioned therein or plainly marked on the accompanying drawings as being installed or supplied by others.

1.2 Contractor Qualifications/Quality Assurance

A. Safety and Indemnity

1. Contractors will submit the necessary documentation to demonstrate their compliance with Section 270000 "1.5 A. Safety & Indemnity".

B. Contractor Qualifications

1. Contractors will submit the necessary documentation to demonstrate their compliance with Section 270000 "1.5 B. Contractor Qualification".

C. Quality Assurance

- 1. Contractor shall comply with all requirements as specified in Section 270000 "1.5
 - C. Quality Assurance".

D. Warranty

1. Contractor shall comply with all requirements as specified in Section 270000 "1.8. Acceptance & Warranties".

1.3 Submittal Documentation

A. The successful contractor shall provide their submittal package in accordance with the Section 01 20 00 1.06 Submittal Schedule, and Section 270000 "1.6 Submittal Documentation".

1.4 Equivalent Products

- A. All Products described and Part Numbers given in this Specification are those of Leviton, Berk-Tek, Superior Essex, and Cooper B-Line unless otherwise noted.
- B. Pre-Approved Equals:
 - 1. Utility Vault Company, Christy Concrete, BES
 - 2. Hoffman, B-Line, Circle AW
 - 3. CARLON, Allied Tubing, MaxCell
 - 4. RANDL Inc , Thomas & Betts, Bridgeport, Appleton, Erico, Minerallac
 - 5. Wiremold, Hubbell
- C. Contractors wishing to approve a system other than those specified in this document shall do so in accordance with Section 270000 "1.7 Equivalent Products".

PART 2 – PRODUCTS

2.1 Pathways & Fittings

A. Communication Underground Boxes

- 1. Communication Pull Boxes
 - Provide separate pre-cast concrete pull boxes, with lids labeled "communications" (for TV, telephone, data, security).
 - Type equal to "Christy N16, N30, N40, N44" steel reinforced solid concrete box, concrete lid & 12" extension box shall be used. See project drawings for locations & additional requirements.
 - Shall be constructed out of 3000 PSI steel reinforced concrete.
 - Install on 6" gravel pad and provide drain. See project details for more info.
 - Pull boxes in traffic areas and along roads shall be designed and installed for H20-44 loading.
 - Pull boxes shall be located and provided with grade rings as necessary to ensure that water is drained from conduits.
 - Pull boxes shall be installed to minimize surface drainage entry as follows:
 - 1. Pull boxes should not be located in paths or streets. If such location cannot be avoided, pull boxes should not be located in low spots or drainage channels.
 - 2. Pull boxes not located in paths or streets should be installed so that the top is approximately 2" above final grade.
 - All pull boxes shall be installed with a mow strip minimum of 6".
 - Non-slip lids shall be provided for pull boxes in sidewalk areas. Use concrete or fiberglass-no metal lids in sidewalks.
 - Quantity: Contractor will provide pull boxes and covers in the sizes and quantities as shown on the drawings.

2. Communication Vaults

- Provide separate pre-cast concrete vault, with lids labeled "communications" (for TV, telephone, data, intrusion alarm).
- Vaults shall be equipped with a cable racking on the long walls suitable to support large copper cables as called for on the design documents.
- Vaults shall include; Anchorage, Lifting Inserts and Racking Devices.

- All Vaults shall be equipped with traffic-rated lids with a locking mechanism. All lids shall have the identification marking of "Communications" permanently affixed to the cover.
- All pull boxes shall be installed with a mow strip minimum of 12".
- Quantity: Contractor will provide vaults and covers in the sizes and quantities as shown on the drawings.
- Standard Vault size 24"x36"x36" equal to Old Castle 2436-STD
- Large Vault size 36"x60"x36" equal to Old Castle 3660-STD

3. Communication Vault Accessories

UNDERGROUND CABLE RACK

HOOKS Lite Duty Extension

- Formed from 3/16 inch steel
- Hot dipped galvanized per ASTM A123 / A153
- Smooth top surface to protect cables from damage
- Insulator 11A31 fits these hooks
- Part numbers Inwesco or equal

Catalog	Extension From
10A35	4
10A36	7-1/2
10A37	10
10A38	14
10A39	18

4. Heavy Duty Extension

- Formed from 10 ga. steel
- Hot dipped galvanized per ASTM A123 / A153
- Unique design locks hook into rack
- Part numbers Inwesco or equal

Catalog No.	Extension From Face of Rack (Inches)
10C38	14

5. J-Hook Cradle

- Curved design to cradle cable
- Available in fusion bonded epoxy coated steel
- Available in injection molded ABS plastic
- Steel used is 1/4 inch thick x 15/16 inch wide
- ABS plastic hooks are 1-3/8 inch wide
- ABS plastic hooks furnished with locking tab
- Part numbers Inwesco or equal

Catalog No.	Туре	Diameter Of Curve
10A60	Coated Steel	2-1/2
10B60	Plastic	2-1/2
10A61	Coated Steel	5
10B61	Plastic	5

6. Surface-Mounted Entrance Cabinets Type 1 & 12

- The Contractor shall provide a minimum of a NEMA 1 type enclosure that meets the UL 50, File No. E27567: Type 1 NEMA/EEMAC Type 1 CSA, File No. LL42184: Type 1 IEC 60529, IP30 standards for indoor applications.
- The Enclosure shall be constructed from 16 awg galvanized steel, with a drip shield top and seam free side, front and back.
- The Enclosure shall have a "slip-on" removable front cover held in place with steel screws.
- Enclose shall incorporate pre-punched knockouts for standard trade size conduits up to 1".
- The size of cabinets mounted on an outside wall to serve a smaller building shall be as indicated on the construction plans.
- Quantity: Contractor will provide boxes in the sizes and quantities as shown on the drawings.

7. Surface-Mounted Entrance Cabinets Type 3R and 4X

- The Contractor shall provide a minimum of a NEMA 3R type enclosure that meets the UL 50 for outdoor applications.
- The Enclosure shall be constructed from 16 awg galvanized steel, with a drip shield top and seam free side, front and back.
- The Enclosure shall have a "slip-on" removable front cover held in place with steel screws.
- Enclose shall incorporate pre-punched knockouts for standard trade size conduits up to 1".
- The size of cabinets mounted on an outside wall to serve a smaller building shall be as indicated on the construction plans.
- Quantity: Contractor will provide boxes in the sizes and quantities as shown on the drawings.

B. Metallic Pull Boxes and Terminal Cans

- 1. NEMA Type 1 Screw Cover Cans
 - Used for indoor use only
 - NEMA/EEMAC Type 1, IEC 60529, IP30
 - UL 50, 50E Listed; Type 1; File No. E27525, cUL Listed per CSA C22.2 No 40; Type 1; File No. E27525
 - 16, 14 or 12 gauge steel or plated steel
 - ANSI 61 gray polyester powder paint finish inside and out.
 - Minimum size 6x6x4
 - Pre-Approved Sizes

Hoffman ASE6X6X6, ASE10X10X6, ASE12X12X6, ASE18X12X6, ASE18X18X6, ASE24X18X6, ASE24X24X6

- Provide "NK" for No Knock-Outs as required.
- Provide "AFE" Flush Covers as required.
- Provide "AFDF" Flush Doors on all cans in user accessible areas IE; Data Closets, Electrical Rooms, Janitor Rooms, and Mechanical Rooms.
- Provide "ACLFDF" Lock Kits for all cans in student areas.

2. NEMA 3R Terminal Cans

- Used for outdoor use under-eve, breezeway or parapet
- NEMA/EEMAC Type 3R, IEC 60529, IP32
- UL 50, 50E Listed; Type 3R; File No. E27567, cUL Listed per CSA C22.2
 No 94; Type 3R File No. E27567
- 16 gauge galvanized steel
- ANSI 61 gray polyester powder paint finish inside and out over galvanized steel.
- Minimum size 12x12x6
- Hoffman A12R126HCR, A18R186HCR, A20R208HCR, A30R308HCR

3. NEMA 4 Terminal Cans

- Used for outdoor use vertical or Horizontal under-eve, breezeway or parapet
- 16 or 14 gauge steel (see table)
- Seams continuously welded and ground smooth
- Stainless steel door clamps on three sides of door
- ANSI 61 gray polyester powder paint finish inside and out over galvanized steel.
- Minimum size 16x16x6
- Hoffman A16H16ALP, A20H20ALP, A24H24ALP, A36H24ALP

C. Conduit

1. Rigid Steel Conduit

- Rigid steel conduit shall comply with Underwriter's Laboratories UL-6 Specification, ANSI C80.1 and Federal specification WW-C-581E or latest
- revisions. Conduit shall be hot dip galvanized on the exterior, with zinc or enamel on the interior.
- Couplings, locknuts, and all other fittings shall be galvanized or sheardized, waterproof and threaded type only. Rigid conduit shall terminate with two locknuts; one outside and one inside enclosures and specified bushings. No running threads or chase nipples shall be issued without approval.
- Bushings shall be non-metallic for 1 inch and smaller and insulated metallic for conduits larger than 1 inch.
- Galvanized rigid steel conduits (GRC) way be used in all locations.
 For underground runs in direct contact with earth, conduit shall be wrapped in 10mil PVC tape or shall be factory PVC-over-GRS conduit.
- Intermediate metallic conduit (IMC) may be used indoor and outdoor locations, not underground.

2. Electrical Metallic Tubing (EMT)

EMT conduit shall comply with Underwriter's Laboratories UL 797, ANSI

- C80.3 and Federal Specification WW-C-563 or latest revision. EMT shall be galvanized or sheardized.
- Couplings and connectors for EMT shall be galvanized or cadmium plated and shall be of the compression type requiring the tightening of a nut on a gland ring. No die cast type shall be allowed. All connections shall have permanent insulated throats.
- Electrical metallic conduit (EMT) may be used indoor and outdoor locations, not underground, not in areas subject to physical damage, not in concrete slabs, not in hazardous areas, not in masonry walls.

3. Schedule 40 PVC:

- The minimum conduit trade size allowed for this project will 2". Contractor will increase to the next higher trade size if conduit fill ration will exceed 40%.
- Conduit shall be Carlon or equal, rated for use with 90° C conductors, UL Listed or approved equal. Material shall comply to NEMA Specification TC-2 (Conduit), TC-3 (Fittings) and UL 651 (Conduit) and 514b (Fittings).
- Conduit and fittings shall carry a UL label (Conduit on each 10 foot length; Fittings stamped or molded on each fitting).
- Conduit and fittings shall be identified for type and manufacturer and shall be traceable to location of plant and date manufactured. The markings shall be legible and permanent.
- The Conduit shall be made from polyvinyl chloride compound (recognized by UL) which includes inert modifiers to improve weatherability and heat distortion. Clean rework material, generated by the manufacturer's own conduit production, may be used by the same manufacturer, provided the end products meet the requirements of this specification.
- The conduit and fittings shall be homogeneous plastic material free from visible cracks, holes or foreign inclusions. The conduit bore shall be smooth and free of blisters, nicks or other imperfections which could mar conductors or Cables.
- Conduit, fittings and cement shall be produced by the same manufacturer to assure system integrity.
- Testing and Acceptance Criteria: Conduit and fittings shall be tested in accordance with the testing requirements defined in NEMA TC-2, NEMA TC- 3 and UL-651 and 514. The acceptance criteria shall be given in the same standards.
- All conduit and fittings shall be solvent cemented in applications in accordance with instructions from the manufacturer.
- Conduit Spacers
- High impact spacers shall be used in all multi-conduit duct banks (five or more conduits). The spacers shall conform to NEMA TC-2, TC-6, TC-8, and ASTM F 512.
- Spacers shall be installed and secured following the manufacturer's suggested guidelines, the BICSI CO-OSP Manual, or TIA/EIA 578, whichever is more stringent.
- 4. Pipe hangers for individual conduits shall be factory made, consisting of a pipe ring and threaded suspension rod. The pipe ring shall be malleable iron, split and hinged, or shall be interlocked with the suspension rod socket.

- 5. Pipe racks for a group of parallel conduits shall be galvanized structural steel preformed channels of length as required, suspended on threaded rods and secured thereto with nuts above and below the cross bar. All offsets shall be in the same plane and shall be parallel.
- 6. Factory made pipe straps shall be one-hole malleable iron or two-hole galvanized clamps.
- 7. Manufacturer: Appleton, Crouse-Hinds, B-Line, Unistrut, T&B, or an approved equivalent product.

8. Conduit Terminations and Plugs

- All conduits entering a vault or pullbox shall be equipped with a bell-end securely attached to the structure.
- All metal conduits shall be equipped with a bushing or end collar to protect cable during placement.
- All unused conduits placed on this project or cleaned and modified by the Contractor shall be equipped with reusable rubber or plastic expansion seal plugs in all utility vaults/pull boxes and within all buildings.

9. Conduit Flexible Type

- Flexible conduit "Steel Flex or Aluminum Flex" may only be used for attic jbox to device connection, where specified in the project drawings or with consent of the owner/consultant representative.
- Liquidtight flexible conduit may only be used where specified in the project drawings or with consent of the owner/consultant representative.
- GRC & IMC fittings shall be galvanized rigid steel threaded type. Provide insulated grounding bushings at all enclosures.
- EMT fittings shall be die cast or steel set screw type for dry locations, die cast or steel compression type for wet locations. Provide insulated grounding bushings at all enclosures.
- PVC fittings shall be schedule 40 or schedule 80, provide adapters at all enclosures and transitions to GRC, IMC or EMT conduits.
- Flexible fittings shall be die cast or steel type.
- Liquidtight fittings shall be steel compression type.
- Provide insulated screw on bushings on all conduit connections.
- Provide insulated push on bushings for all stubb-out conduits.
- Quantity: Contractor will provide conduits in the sizes and quantities as shown on the drawings.

10. Textile Innerduct - MaxCell

- Made from White Polyester and Nylon resin polymer
- Standard Outdoor Textile Innerduct: Micro (33mm), 2-inch, 3-inch and 4-inch single or multi-cell polyester/nylon textile innerduct containing 1250lb polyester flat woven pull tape.
- Detectable Outdoor Textile Innerduct: Micro (33mm), 2-inch, 3-inch and 4-inch single or multi-cell polyester/nylon textile innerduct containing 1250lb polyester flat woven pull tape, and a solid copper, polyvinyl color coated conductor (19AWG minimum) for tracing and rated for a minimum of 6 amps and 600 volts. Conductor shall be placed in the sidewall edge fold of the textile sleeve.
- Indoor Textile Innerduct (Riser-listed): Micro (33mm), 2-inch, 3-inch and 4-inch single or multi-cell nylon textile innerduct containing 1250lb polyester

- flat woven pull tape which meets UL2024A for flame propagation and smoke density values for general applications.
- Plenum-Listed Textile Innerduct: Micro (33mm), 2-inch and 3-inch single or multi-cell nylon textile innerduct containing 200lb nylon-resin flat woven pull tape which meets UL2024A for flame propagation and smoke density values for use in air handling spaces.
- Conduit Plugs: Compression-type conduit plugs with locking nuts for sealing and securing one or more textile innerducts within a 4-inch inside diameter conduit, e.g.: 4-inch plug with nine holes for cables in a 3 pack (9-cell) configuration
- Termination Bags: Inflation-type bags for sealing and securing around one or more textile innerducts and cables within 2-inch outside diameter or larger conduit
- Pull Tape: measuring and pulling tape constructed of synthetic fiber, printed with accurate sequential footage marks. Color-coded.
- Duct Water Seal: products suitable for closing underground and entrance conduit openings where innerduct or cable is installed, to prevent entry of gases, liquids, or rodents into the structure.
- Approved Textile Innerduct #'s MXC4003, MXR4003 MXC3456, MXP3456, MXR3456 MXC2003, MXP2003, MXR2003 MXC2002, MXP2002, MXR2002

D. Duct Bank Locating Cable (Detectable Warning Tape)

1. Warning tape

- Warning Tape shall be a minimum of 3" wide, orange in color, 4 mils thick, and shall have an imprint as follows:
- "Caution Telephone Cable Buried Below" or,
- "Caution Fiber Optic Cable Buried Below"

E. Inter-duct

1. Plenum

- White or orange Kynar PVDF Resin, a fluoropolymer compound.
- Plenum rated flexible optical fiber/communication raceway.
- Provide wire management in a building for fiber optic and data and communications cabling.
- Recognized per CEC Articles, 770 and 800 for Plenum, Riser and General Purpose Raceway for optical fiber, and telecommunications cables.
- UL Listed
- Meets UL 910 standards for Plenum Optical Fiber/Communications raceways.
- Provide all fittings to form a complete integrated raceway system.
- Extrude raceway from precision extruded PVDF resin
- 1"-2"diameter raceway shall have a 1/4" wide 1250 lb. tensile pull tape preinstalled.
- Shall be available in ³/₄" through 2" diameters.
- Footage shall be sequentially marked.
- Threaded Aluminum Coupling: Molded Aluminum fitting which connect two pieces of corrugated tubing equipped with threaded ends.
- Quick-Connect Couplings: Molded Part which allows two pieces of 1"

- diameter corrugated tubing to be quickly snapped together. Available only in 1" diameter.
- Quick-Connect Threaded Male Adapters: Molded fitting which quickly snaps onto a 1" diameter piece of corrugated tubing to produce a threaded end. Available only in 1" diameter.
- Quick-Connect Male Snap-In Adapters: Molded fitting which snaps onto a 1" diameter piece of corrugated tubing to connect to an outlet or switch box. Available only in 1" diameter.
- Metallic Terminal Adapters: Molded metal part which allows a piece of corrugated tubing to connect to metallic conduit and metallic boxes.
- Spool Length: Varies, contractor shall field verify prior to ordering.
- Color: Orange
- Part #: Carlon

3/4" CE4X1-1000 1" CF4X1C-1000 1-1/4" CG4X1C-900 1-1/2" CH4X1C-1200 2" CJ4X1C-1400

2. Riser

- Orange polyvinyl chloride (PVC)
- Riser rated Flexible Optical Fiber/Communication Raceway.
- Provides wire management for fiber optic and data and communications cabling in Riser applications and/or General Purpose applications within a building or for direct burial or concrete encasement.
- Recognized per CEC Articles, 770 and 800 for Plenum, Riser and General Purpose applications for optical fiber, and telecommunications cables.
- UL Listed
- Listed under UL 1666 Standard for Riser Application for Optical Fiber Raceway.
- Provide all fittings to form a complete integrated raceway system.
- Fabricate Raceway from precision extruded PVC resin.
- Kevlar pull tape can be preinstalled in the 1" through 2" diameter.
- The footage shall be sequentially marked.
- Shall be available in ³/₄" through 2" diameters.
- Threaded Aluminum Coupling: molded Aluminum fitting which connect two pieces of corrugated tubing equipped with threaded ends.
- Quick-Connect Couplings: Molded Part which allows two pieces of corrugated tubing to be quickly snapped together. Available only in ½"-1" diameter.
- Quick-Connect Threaded Male Adapters: Molded fitting which quickly snaps onto a piece of corrugated tubing to produce a threaded end. Available only in ½"-1" diameter.
- Quick-Connect Male Snap-In Adapters: Molded fitting which snaps onto a
 piece of corrugated tubing to connect to an outlet or switch box. Available
 only in ½"-1".
- Metallic Terminal Adapters: Molded metal part which allows a piece of corrugated tubing to connect to metallic conduit and metallic boxes.
- Schedule 40 Fittings: Molded fitting that is solvent cemented to the raceways. Schedule 40 fittings are commonly used with PVC Schedule 40 rigid conduit.

- Spool Length: Varies, contractor shall field verify prior to ordering.
- Color: Orange
- Part #: Carlon

3/4" DE4X1-1000 1" DF4X1C-1000

1-1/4" DG4X1C-900

1-1/2" DH4X1C-1200 2" DJ4X1C-700

- 3. General Purpose for use in Underground Conduit
 - Orange polyvinyl chloride (PVC)
 - General Purpose is nonmetallic flexible raceway for use in General Purpose applications only. It is UL Listed and available with tape pre-installed.
 - General Purpose raceway is listed to UL 2024 in accordance with the California Electrical Code per Articles 725, 770, 800 and 820 for General Purpose and other cabling optical fiber/telecommunication applications.
 - For use in General Purpose areas per Articles 725, 770, 800 and 820 of the CFC
 - Available in sizes 3/4" through 2"
 - Pull tape can be factory pre-installed in 1" through 2"
 - Outside Diameters meet IPS Dimensions
 - Footage sequentially marked
 - Spool Length: Varies, contractor shall field verify prior to ordering.
 - Color: Orange
 - Part #: Carlon

1" BF4X1B-8000

1-1/4" BG4X1B-5600

1-1/2" BH4X1B-4500

2" BJ4X1B-8000

F. Outlet Boxes

- 1. Outlet boxes (voice, data and audio visual)
 - All boxes shall be 5 in. Square x 2.875 in. Deep Metal Box with Cable Management minimum. As required provide 4-11/16" square by 2-1/8" deep.
 - □ Volume: 64 in3 (1050 cm3)
 - Side Knockouts: (1) 1"& (1) 1-1/4" each side
 - Listing: C ETL US; for use on Class 2 and Class 3 Remote-Control, Signaling and Power-Limited Circuits only.
 - Provide **varied depth** mud ring as required to allow no more than 1/8" gap between wall materials.
 - Any unused outlet or j-box shall be equipped with a blank cover.
 - Approved Outlet box shall be RANDL Inc. T-55 series
- 2. Outlet boxes (wall phone, microphone and other devices)
 - All boxes shall be 4-11/16" square by 2-1/8" deep minimum.
 - Provide **varied depth** mud ring as required to allow no more than 1/8" gap between wall materials.
 - Any unused outlet or j-box shall be equipped with a blank cover.
- 3. Junction boxes
 - All boxes shall be 4-11/16" square by 2-1/8" deep minimum.

- Provide **varied depth** mud ring as required to allow no more than 1/8" gap between wall materials.
- Any unused outlet or j-box shall be equipped with a blank cover.

4. Surface Mount boxes

- base has rectangular KO to enable extension from existing single-gang flush wall box and 1/2" and 1" trade size concentric KOs.
- Accepts NEMA Faceplates
- one-gang 4 3/4" H x 3" W x 2 3/4" D equal to Wiremold # 2344
- two-gang 4 3/4" H x 4 7/8" W x 2 3/4" D equal to Wiremold # 2344-2

G. Floor Boxes

- 1. Floor boxes provide the interface between power and communication cabling in an on-grade or above-grade concrete floor where power and communication services are required. Boxes shall provide flush or recessed device outlets that will not obstruct the floor area.
- 2. Provide floor boxes approved for use in concrete floor construction. Boxes shall be approved for above grade (stamped steel) and on grade (cast iron) applications. Floor boxes shall have been examined and tested by Underwriters Laboratories Inc. to meet UL514A and Canadian Standard C22.2 and shall bear the appropriate label. Floor boxes shall conform to the standard set in the California Electrical Code. Multi-compartment box shall have been evaluated by UL to meet the applicable U.S. and Canadian safety standards for scrub water exclusion when used on tile, terrazzo, wood, and carpet covered floors.
- 3. Boxes shall be available in one-, two-, or three-gang configurations or a single unit with four independent wiring compartments and available in stamped steel and cast iron versions. Boxes shall be rectangular in shape and available in deep and shallow versions. Boxes shall provide pre- and post-pour adjustments. Multiple gang boxes shall also provide a removable barrier between the individual compartments for greater capacity when required.
- 4. Multi-Compartment Boxes: Floor boxes shall be manufactured in stamped steel or cast-iron. Box shall be available in shallow version for stamped steel or cast-iron types and deep version for stamped steel type only. Box shall have four independent wiring compartments that allow up to 4 duplex receptacles and/or communications services.
 - Boxes shall permit a tunneling feature that will allow internal wiring to various compartments. The box shall provide various size conduit openings.
 - Boxes shall be fully adjustable, providing a maximum of 1-7/8 inch pre-pour adjustment, and a maximum of 3/4 inch post-pour adjustment.
 - Boxes shall provide a series of device mounting plates that will accept both duplex power devices, as well as plates that will accommodate connectivity outlets and modular inserts. Where indicated, provide connectivity outlets and modular inserts by Ortronics or approved equal.
 - Activation covers shall be die-cast aluminum. Cover finish shall be one of the following, as selected:
 - a. textured aluminum finish.

- b. Powder coat finish, color shall be Black.
- c. Powder coat finish, color shall be Brass.
- Activation covers shall be available in flanged or flangeless versions as selected. Covers shall be available with options for tile or carpet inserts, blank covers, or covers with one or two 1 inch liquid tight openings for furniture feed applications as applicable.
- Pre-Approved Floor boxes shall be equal to Wiremold RFB-4 & RFB-9 series boxes.
- Contractor shall provide all required entrance fittings & adapter plates for scope of work depicted.

H. Surface mount raceway "SMR"

- 1. Non-metallic raceway is an enclosed pathway used for surface distribution of branch circuit electrical wiring, and cabling for voice, data, multi-media, low voltage, and optical fiber. Raceway is typically installed in existing building structures, or after construction is complete. A complete raceway system includes raceway, covers, mounting hardware, various fittings, and outlet boxes installed at specific locations. Specific codes and standards apply to electrical wires and telecommunications cables that are deployed within non-metallic raceway. Codes that are enforced by the local Authority Having Jurisdiction (AHJ) must be observed during construction.
 - Assembly and disassembly of raceway base, cover, and fittings shall require no special tools.
 - Installed fittings shall be designed to overlap the raceway junction to cover exposed or uneven edges.
 - Security caps shall provide enhanced tamper protection by installing over the assembled raceway in desired locations.
 - Raceway shall be designed to accept inline device boxes with either horizontal or vertical faceplate orientations.
 - Device boxes shall have a removable knockout portion to permit raceway entry and exit. Device boxes shall serve as an extension box by removing a single knockout.
 - Device boxes shall be available in standard NEMA single, double, and 3-gang versions. Device box color shall match raceway color.
 - Device boxes shall accommodate various faceplates that accept modular connector inserts or bezels for balanced twisted pair, fiber optic, coaxial, multi-media, and other low voltage cabling connectors.
 - Faceplates for device boxes shall accommodate pre-printed labels for proper electrical identification, or telecommunications port identification according to ANSI/TIA/EIA-606-A.
 - Faceplates shall be available in colors that match the device box and raceway.
 - Category rated communications jacks installed in surface box faceplates shall have provisions for snap-in icons for further identification.

2. 5400 Series

• The raceway shall be a two-piece design with a base and snap-on covers. The raceway base shall accept both a single cover that spans the entire base or two individual TwinSnapTM covers. Total width shall be 5.25" [133mm] by 1.75" [44.5mm] deep with an approximate thickness of .095" [2.4mm].

The base and cover shall be available in 8' [2.4m] lengths. The raceway shall be available with two (5400TB) or three (5400TBD) wiring channels. VERIFY WITH OWNER BEFORE USING ANY RACEWAY. IT IS ALWAYS PREFERRED TO HAVE CABLING CONCEALED IN THE WALLS

- The 5400TB Series Base shall have two wiring channels separated by one integral barrier. Each channel must be large enough to accept standard power and communication devices without restricting capacity of the adjacent channel. The 5400TBD Series Base shall have three wiring channels separated by two integral barriers forming 1/2, 1/4, and 1/4 compartments. One channel must be large enough to accept standard power and communication devices without restricting capacity of the other channels. The 5400C Series Cover shall span the entire width of the base concealing all of the wiring channels. The 5400TC Series Cover shall have flanges for snapping onto the base side walls and center barrier. The cover shall span one-half the width of the base, providing independent access to services.
- A complete line of full capacity corner elbows and tee fittings must be available to maintain a controlled 2" [51mm] cable bend radius which meets the specifications for Fiber Optic and UTP/STP cabling and exceeds the TIA / EIA 569-A requirements for communications pathways. They shall be manufactured of a rigid PVC compound. A full complement of fittings must be available including, but not limited to tees, entrance fittings, cover clips, and end caps. They shall be manufactured of a rigid PVC compound. The fittings shall have a matte texture, in ivory or white colors to match the base and cover. They shall overlap the cover and base to hide uneven cuts. All fittings shall be supplied with a base where applicable to eliminate mitering. A transition fitting shall be available to adapt to other Wiremold series raceways.
- Device brackets shall be available for mounting standard devices in-line or
 offset from the raceway. A device bracket shall provide up to three singlegang openings at one location. Faceplates shall be 5507 Series that match
 and fit flush in the device plate. They shall be manufactured of rigid PVC
 compound.
- The raceway manufacturer will provide a complete line of connectivity outlets and modular inserts for UTP, STP (150 ohm), fiber optic, coaxial and other cabling types with faceplates and bezels to facilitate mounting. A complete line of preprinted station and port identification labels, snap-in icon buttons, as well as write-on station identification labels shall be available.
- If raceway does not exist and plans show raceway to be installed, verify with owner BEFORE any installation occurs. The Owner prefers all cables to be inside the walls, whenever possible. Verify with Owner on location Contractor believes raceway is required.

I. Cable Tray Systems

Provide cable tray system to route power and communications cable distribution for utility needs. Cable tray system shall consist of cable tray and appropriate fittings for a complete installation.

1. Cable tray is to be utilized in locations only as covered in Article 392 of the California Electric Code, as adopted by the National Fire Protection Association

and as approved by the American National Standards Institute.

- 2. Trays shall be constructed of 6063 T6 and T5 aluminum alloys and shall utilize center lines to indicate all areas where after field cutting of tray, new holes need to be drilled or screws inserted (Center Spine, Twin Spine, Ladder Style and Wall Mounted Trays).
- 3. Ladder Tray: Cable tray shall be constructed to form an open and accessible compartment to hold the necessary cables. The tray shall be constructed of two components, (1) two longitudinal support rails (side rails) and (2) the rungs. The rail shall be a single aluminum extrusion with extending flanges that provide rung support. The rungs shall have 7/8 inch cable laying surface and be attached with sheet metal screws to the two side rails on 6 inch, 9 inch or 12 inch centers, creating a cable laying area between the rails.
- 4. Wall Mounted Cable Tray: Cable tray shall be constructed to form an open and accessible compartment to hold the necessary cables which also enables full viewing of the compartment. The tray shall be wall mounted allowing cable layin where applicable.
 - Trays shall be constructed with two components, (1) the main support which is the spine and (2) the rungs. The spine shall be a single aluminum extrusion designed with a lower cavity which has extending wings and provides rung support.
 - Rungs shall have a 1 inch cable laying surface, and be attached on 6 inch, 9 inch or 12 inch centers, and protrude from the spine only on one side. The end of the rungs shall be bent upward to the height of 3 inches, 4 inches or 6 inches as applicable forming a 90 degree angle. This creates a cable laying area between the spine and the vertical portion of the rung. The rung shall be designed with a center screw groove along its length to provide a direct connection for rung mounted accessories. The ends of all rungs shall be fitted with a plastic cap to prevent damage to the cable and injury to the installer.
 - For multi-tier wall mounted trays, the lower rungs shall be mounted through the entire vertical distance of the spine and project down, be bent outward, then up from one side only, forming a 'J' hook shape. These rungs shall be fixed in place with a sheet metal screw through the top of the spine which allows for replacement or expansion of the tray area.
 - Top and bottom rungs shall form two or three tiers of cable tray, one above the other, attached to one single support member or spine.
 - Tray shall not have side rails and shall offer an open view of the cables.
- 5. A full complement of fittings for the cable tray shall be available including, but not limited to, 45 and 90 degree flat, vertical inside and outside elbows, tee and cross fittings, couplings for joining sections of the tray, hangers, end blanks, field- installed dividers and all other components necessary to make the system perform as intended. The fittings and accessories shall be of a compatible material.
- 6. Ladder Rack Cable Runway
 - Stringers shall be fabricated from ASTM A513 Steel tubing.
 - Rungs shall be fabricated from 3/8"x1 ½" steel channel welded

- Rungs shall be spaced at 12.0" center to center
- Ladder Rack shall have a powder coat finished.
- Ladder Rack shall be individually boxed
- Ladder rack shall be part of a total system that includes: manufacture bends, wall supports, joining hardware, etc.
- Ladder Rack shall be grounding per the TIA/EIA 607-A.
- Ladder Rack shall be UL listed- File number E60548
- Color: Ladder Rack will be BLACK
- Quantity: See Drawing for quantity and installation details.
- Part#: Equal to Cooper B-Line Ladder Rack, PN# SB17U12BFB

7. Wire Basket Cable Runway

- Wire mesh cable tray shall be manufactured from round carbon steel wires that are 5 mm and 6 mm in diameter. Wires shall be welded at intersections to form a 2" x 4" grid pattern. The tray shall be U-shaped with equal height sidewalls.
- Individual tray sections shall be 10' long and 4", 6", 8", 12", 16", 18", 20", or 24" wide. Sidewalls shall be 4" high, as specified below.
- Wire mesh cable tray shall be zinc electroplated after fabrication, galvanized before fabrication (pre-galvanized) or painted black with powder coat paint, as specified below.
- Wire mesh cable tray that is 6" wide or wider shall be UL Classified for suitability as an equipment grounding conductor only. Pre-galvanized trays shall be UL Classified in the United States. Painted tray shall be UL Classified in the United States.
- Ladder Rack shall be grounding per the TIA/EIA 607-A.
- Color: Zinc Electroplate
- Quantity: See Drawing for quantity and installation details.
- Part#: Equal to Chatsworth Products OnTrac
 - o Part Number 34821-504, 4" High x 4" Wide x 10' Long.
 - o Part Number 34821-506, 4" High x 6" Wide x 10' Long.
 - o Part Number 34821-508, 4" High x 8" Wide x 10' Long.
 - o Part Number 34821-512, 4" High x 12" Wide x 10' Long.
 - o Part Number 34821-516, 4" High x 16" Wide x 10' Long.
 - o Part Number 34821-518, 4" High x 18" Wide x 10' Long.
 - o Part Number 34821-520, 4" High x 20" Wide x 10' Long.
 - o Part Number 34821-524, 4" High x 24" Wide x 10' Long.
- Provide all installation hardware required for installation whether shown on the plans or not. Some of the supports may require design build application and shall be included by the contractor without notice.
 - o OnTrac Standard Splice Kit
 - o OnTrac Splice Bar
 - o OnTrac Splice Washer & Bolt Kit
 - OnTrac Spring Splice Kit
 - o OnTrac Clamp Washer
 - o OnTrac Carriage Bolt Hardware Kit
 - o OnTrac 90° Splice Bar Kit
 - OnTrac Rack-Mount Hook
 - OnTrac Pedestal Clamp Bracket
 - o Split Bolt Grounding Clamp o OnTrac Cable Tray Divider o OnTrac Cover
 - o OnTrac Cable Trav Bottom Insert
 - o OnTrac Cable Tray Liner

- o OnTrac Tool-Less Radius Drop
- OnTrac Large Radius Drop
- o OnTrac Vertical Radius Bracket o OnTrac Electrical Box Bracket
- o OnTrac Conduit Bracket
- o OnTrac Auxiliary Side Bracket
- o OnTrac Section Support Bracket
- OnTrac Label Holder
- o OnTrac Cable Tray Cutting Tool
- o Threaded Rod, 3/8-16
- o Threaded Rod Coupling Kit, 3/8-16
- o Threaded Rod I-Beam Clamp, 3/8-16
- o Hex Nut, 3/8-16
- o Split Lock Washer, 3/8"
- o Washer, 3/8"
- o Hex Lag Screw, 3/8-7 x 2" Long o Hex Lag Screw, 1/4-10 x 2" Long o Split Lock Washer, 1/4"
- Provide all support systems required for installation whether shown on the plans or not. Some of the supports may require design build application and shall be included by the contractor without notice.
 - o OnTrac Wire Mesh Cable Tray System Supports
 - o OnTrac Ceiling Center Support Bracket
 - o OnTrac Ceiling Edge Hanger
 - o OnTrac Ceiling Trapeze Support Bracket o OnTrac Wall/Ceiling C-Support Bracket o OnTrac Wall L-Support Bracket
 - o OnTrac Wall Triangle Support Bracket
 - o OnTrac Wall-Mount Angle
 - o OnTrac Under Floor Support
 - o OnTrac Under Floor C-Bracket
 - o OnTrac Pedestal Clamp Bracket Kit

J. Cabling Support System

1. Telco Backboards

- Backboards shall be 4' x 8' x .75" void free plywood (ACX Plywood with the "A" side turned out).
- The plywood shall be painted with two coats of white fire retardant paint.
- Cut full size sheet to required size for application type.

2. J-Hooks

- Cable supports shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance cables; cULus Listed.
- Cable supports shall have flared edges to prevent damage while installing cables.
- Cable support system shall provide fasteners that allow them to be mounted to wall, concrete, joist, tee-bar wire, treaded rod, beams and raised floor supports.
- Fasteners shall have the ability to either be factory or jobsite assembled; rated for indoor use in non-corrosive environments; cULus Listed.
- Fastener to with one non-continuous cable support, factory or jobsite assembled.
- Color: NA
- Quantity: Contractor will provide quantities of j-hooks and hanger accessories in the amount necessary to support all horizontal cabling every 14" 28". The load per hook shall not exceed the Owner's 40% fill ratio.

All hooks shall have a retainer clip installed as part of the hook. Verify with Owner as to what 40% fill is.

• Part#: ERICO CAT425, Cooper B-Line BCH12, BCH21, BCH32, BCH64 and accessories.

3. In-ceiling support brackets

- Above-ceiling cable termination locations shall be either wall-mounted or suspended from structure above the drop ceiling. Cables or terminations shall not rest on ceiling grid or equipment above ceiling grid.
- For Wireless Access Points and other above-ceiling-mounted communications devices, cables shall land in an above-ceiling bracket which is affixed to dedicated cable support hardware.
- Two category-rated jacks may be installed in each above-ceiling bracket.
 Each above-ceiling bracket will hold a 2-port Surface-Mount Box or 1-U MOS SMB for multimedia applications.
- For wall-mounted device locations (above or below ceiling), devices needing to be mounted directly to a backbox will utilize the in-wall mounting bracket to secure the jack inside the backbox.
- One category-rated jack can be installed in each in-wall backbox jack mounting bracket. For devices requiring (2) category-rated jacks, (2) in-wall brackets must be used.
- Part #:

Leviton QuickPort In-Ceiling Bracket, rod/wire hanger, 49223-CBC Leviton QuickPort In-Ceiling Bracket, accepts beam and screw mounts, 49223-CB0 Leviton QuickPort In-Wall Bracket, 49223-BA5 (pack of 5)

K. Pull Rope

- 1. Pulling Ropes (Mule tape)
 - Pull ropes shall be 1/2" flat tape with a minimum tensile strength of 1200 lbs
 - Ropes shall be pre-lubricated, woven polyester or aramid fiber tape made from low friction, high abrasion resistant yarns providing a low coefficient of friction. Tape shall be printed with sequential footage markings for accurate measurements.

2. Empty Conduits

- Pull rope shall be new 1/2" flat tape with a minimum 1200 lb. tensile strength.
- Every empty conduit shall be equipped with a pull rope secured to the duct plug at each end.

3. Installed with Cables:

- Pull rope shall be new 1/2" flat tape with a minimum 1200 lb. tensile strength.
- Contractor is required to install a pull rope into every conduit that they pull cabling in.

2.2 Fire Stop Systems

A. General

- 1. Sleeves shall be 2", 3" or 4" EMT or smaller. All cables penetrating walls must be sleeved.
- 2. Sleeves shall maintain a 40% conduit fill ratio.
- 3. Sleeves must be supported or attached at walls by apparatuses meant to do so. All sleeves shall be rigidly and properly supported.
- 4. Sleeves must extend past inaccessible areas.
- 5. Sleeves must be protected by a U.L. rated system at all firewalls designated on the construction drawings.
- 6. Fire stopping shall be a material, or combination of materials, to retain the integrity of time-rated construction by maintaining an effective barrier against the spread of flame, smoke, and gases. It shall be used in specific locations as follows:
 - Duct, cables, conduit, piping, and cable tray penetrations through floor slab and through time-rated partitions or fire walls.
 - Openings between floor slab and curtain walls, including inside hollow curtain walls at the floor slab.
 - Penetrations of vertical service shafts.
 - Openings and penetrations in time-rated partitions of fire walls containing fire doors.
 - Locations where specifically shown on the drawings or where specified in other sections of the Standards.
- 7. Fire stopping materials shall be asbestos free and capable of maintaining an effective barrier against flame, smoke, and gasses in compliance with requirements of ASTM E 814, and UL 1479. Only listed fire stopping material acceptable to State, County, and City codes shall be used.
- 8. The rating of the fire stops shall in no case be less than the rating of the time rated floor or wall assembly.
- 9. All Fire stopping Locations (FSL) shall be labeled within 12" of the fire stopping material on each side of the penetrated fire barrier. The format for the Fire stopping Location identifier shall display the Telecom Room floor number, the Fire stopping Location number, and the hour rating of the fire rating system (e.g. 1-FLS001 (2)). Each fire stopping location shall be identified with a fire stopping warning label. The label shall include the manufacturer of the product, the installer and company name, the UL number for the product, the rating of the material, the installation date, and the number and type of cables passing through the opening. The fire stopping warning label can include the fire stopping location identifier, eliminating the need for a separate label. Penetration modifications requiring the repair/re-installation of the fire stopping material require the addition of a new fire stopping warning label. No previous fire

stopping warning labels shall be removed or obscured by new labels. In the event the penetration is completely cleaned of existing fire stopping material, and new material is installed, the previous label shall be removed or obscured completely.

10. Manufacturers; Specified Technologies Inc., 3M & Hilti

- SSS intumescent sealant
- SSP putty and putty pads
- SSAMW mineral wool
- IC 15WB+ intumescent sealant
- CP 25WB+ intumescent sealant
- Fire Barrier Moldable Putty+ putty and putty pads
- FS-ONE intumescent sealant
- CP 618 putty and putty pads.

B. Single Entry System

- The 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.
- Fire stop systems comprise an effective block for fire, smoke, heat, vapor and pressurized water stream.
- All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate 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.
- Fire stop systems shall be UL Classified to ASTM E814 (UL 1479).
- Quantity: See Drawing for quantity and installation details.
- Part#: Equal to STI, PN# SSS100

C. Re-Enterable Fire Stop System

- 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.
- No additional fire stopping material shall be required to obtain proper fire stopping.
- The system shall offer full fire resistance whether it is empty or 100% visually filled.
- The system shall be self-contained, and shall automatically adjust to differing cable loads.
- The system shall allow add, moves, and changes without additional materials.
- 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.
- Fire stop systems shall be UL Classified to ASTM E814 (UL 1479).
- The system shall be gang-able using wall plates for additional capacity.

- Quantity: See Drawing for quantity and installation details.
- Part #: Equal to STI PN# EZDP33FWS STI PN# EZDP33WR

2.3 Grounding/Bonding Systems

A. Grounding and Bonding Equipment

- 1. Telecommunications Main Grounding Busbar (TMGB)
 - Telecommunications Main Grounding Busbar (TMGB) shall be constructed of .25" (6.4 mm) thick solid copper bar.
 - The buss bar shall be 4" (100 mm) high and 12" (300 mm) long and shall have 18 attachment points (two rows of 9 each) for two-hole grounding lugs.
 - The hole pattern for attaching grounding lugs shall meet the requirements of ANSI-J-STD 607-A and shall accept 15 lugs with 5/8" (15. 8 mm) hole centers and 3 lugs with 1" (25.4 mm) hole centers.
 - The busbar shall include wall-mount stand-off brackets, assembly screws and insulators creating a 4" (100 mm) standoff from the wall.
 - The busbar shall be UL Listed as grounding and bonding equipment.
 - Design Make shall be:
 - Chatsworth Products, Inc. (CPI),
 - Telecommunications Main Grounding Busbar: Part Number 40153-012, 12"
 x 4" (300 mm x 100 mm) Telecommunications Main Grounding Busbar, UL Listed.

2. Telecommunications Grounding Busbar (TGB)

- Telecommunications Grounding Busbar (TGB) shall be constructed of .25" (6.4 mm) thick solid copper bar.
- The busbar shall be 2" (50 mm) high and 10" (250 mm) long and shall have 7 attachment points (one row) for two-hole grounding lugs.
- The hole pattern for attaching grounding lugs shall meet the requirements of ANSI-J-STD 607-A and shall accept 4 lugs with 5/8" (15.8 mm) hole centers and 3 lugs with 1" (25.4 mm) hole centers.
- The busbar shall include wall-mount stand-off brackets, assembly screws and insulators creating a 4" (100 mm) standoff from the wall.
- The busbar shall be UL Listed as grounding and bonding equipment.
- Design Make shall be:
- Chatsworth Products, Inc. (CPI),
- Telecommunications Grounding Busbar: Part Number 13622-010, 10" x 2" (250 mm x 50 mm) Telecommunications Grounding Busbar, UL Listed.

3. Horizontal Rack Busbar

- Horizontal rack-mount busbar shall be constructed of 3/16" (4.7 mm) thick by 3/4" (19.1 mm) high hard-drawn electrolytic tough pitch 110 alloy copper bar.
- Bar shall be 19" EIA or 23" rack mounting width (as specified below) for mounting on relay racks or in cabinets.
- Bar shall have eight 6-32 tapped ground mounting holes on 1" (25.4 mm) intervals and four 0.281" (7.1 mm) holes for the attachment of two-hole grounding lugs.
- Each bar shall include a copper splice bar of the same material (to transition

between adjoining racks) and two each 12-24 x ³/₄" copper-plated steel screws and flat washers for attachment to the rack or cabinet.

- Bar shall be UL Listed as grounding and bonding equipment.
- Design Make shall be:
- Chatsworth Products, Inc. (CPI),
- Horizontal Rack Busbar: Part Number 10610-019, Ground Bar for 19" Rack.

4. Two Mounting Hole Ground Terminal Block

- Ground terminal block shall be made of electroplated tin aluminum extrusion.
- Ground terminal block shall accept conductors ranging from #14 AWG through 2/0.
- The conductors shall be held in place by two stainless steel set screws.
- Ground terminal block shall have two 1/4" (6.4 mm) holes spaced on 5/8" (15.8 mm) centers to allow secure two-bolt attachment to the rack or cabinet.
- Ground terminal block shall be UL Listed as a wire connector.
- Design Make shall be:
- Chatsworth Products, Inc. (CPI),
- Two Mounting Hole Ground Terminal Block:
- Part Number 40167-001, Two Mounting Hole Ground Terminal Block, 1 each
- Compression Lugs
- Compression lugs shall be manufactured from electroplated tinned copper.
- Compression lugs shall have two holes spaced on 5/8" (15.8 mm) or 1" (25.4 mm) centers, as stated below, to allow secure two bolt connections to busbars.
- Compression lugs shall be sized to fit a specific size conductor, sizes #6 to 4/0, as stated below.
- Compression lugs shall be UL Listed as wire connectors.
- Design Make shall be:
- Chatsworth Products, Inc. (CPI),
- Compression Lugs:
- Part Number 40162-901, Compression Lug, #6 Awg, 5/8" (15.8 mm) hole spacing, 1 each.
- Part Number 40162-903, Compression Lug, #6 Awg, 1" (25.4 mm) hole spacing, 1 each.
- Part Number 40162-904, Compression Lug, #2 Awg, 5/8" (15.8 mm) hole spacing, 1 each.
- Part Number 40162-907, Compression Lug, #2 Awg, 1" (25.4 mm) hole spacing, 1 each.
- Part Number 40162-909, Compression Lug, 2/0 Awg, 1" (25. 4 mm) hole spacing, 1 each.
- Part Number 40162-911, Compression Lug, 4/0 Awg, 1" (25.4 mm) hole spacing, 1 each.

5. Antioxidant Joint Compound

- Oxide inhibiting joint compound for copper-to-copper, aluminum-to-aluminum or aluminum-to-copper connections.
- Design Make shall be:
- Chatsworth Products, Inc. (CPI),
- Antioxidant Joint Compound:
- Part Number 40168-101, Antioxidant Joint Compound, Copper-to-Copper

- Connections, .5 oz, 1 each.
- Part Number 40168-801, Antioxidant Joint Compound, Copper-to-Copper Connections, 8 oz, 1 each.
- Part Number 40166-101, Antioxidant Joint Compound, Aluminum-to-Aluminum or Aluminum-to-Copper Connections, .5 oz, 1 each.
- Part Number 40166-801, Antioxidant Joint Compound, Aluminum-to-Aluminum or Aluminum-to-Copper Connections, 8 oz, 1 each.
- Part Number 40168-150, Antioxidant Joint Compound, Copper-to-Copper Connections, .5 oz, 50 each.
- Part Number 40168-812, Antioxidant Joint Compound, Copper-to-Copper Connections, 8 oz., 12 each.
- Part Number 40166-150, Antioxidant Joint Compound, Aluminum-to-Aluminum or Aluminum-to-Copper Connections, .5 oz, 50 each.
- Part Number 40166-812, Antioxidant Joint Compound, Aluminum-to-Aluminum or Aluminum-to-Copper Connections, 8 oz, 12 each.

6. C-Type, Compression Taps

- Compression taps shall be manufactured from copper alloy.
- Compression taps shall be C-shaped connectors that wrap around two conductors forming an irreversible splice around the conductors; installation requires a hydraulic crimping tool
- Compression taps shall be sized to fit specific size conductors, sizes #2 AWG to 4/0, as stated below.
- Compression taps shall be UL Listed.
- Design Make shall be:
- Chatsworth Products, Inc. (CPI),
- Compression Taps:
- Part Number 40163-001, Compression Tap, #6 AWG Solid Run to #6 AWG Solid Tap, 1 each.
- Part Number 40163-007, Compression Tap, 2/0 Stranded Run to 2/0 Stranded Tap, 1 each.

7. Pipe Clamp With Grounding Connector

- Pipe clamp shall be made from electroplated tinned bronze. Installation hardware will be stainless steel.
- Pipe clamp shall be sized to fit up to two conductors ranging in size from #6 to 250 MCM; conductors must be the same size.
- Pipe clamp installation hardware shall be sized to attach to pipes, sizes 1" to 6" (.75" to 6.63" in diameter), as stated below.
- Pipe clamp shall be UL Listed as grounding and bonding equipment.
- Design Make shall be:
- Chatsworth Products, Inc. (CPI),
- Pipe Clamps:
- Part Number 40170-002, Pipe Clamp, for 1" to 1-1/4" pipe, 1 each.
- Part Number 40170-003, Pipe Clamp, for 1-1/2" to 2" pipe, 1 each.
- Part Number 40170-004, Pipe Clamp, for 2-1/2" to 3" pipe, 1 each.
- Part Number 40170-005, Pipe Clamp, for 3-1/2" to 4" pipe, 1 each.
- Part Number 40170-006, Pipe Clamp, for 5" to 6" pipe, 1 each.

8. Equipment Ground Jumper Kit

• Kit includes one 24"L insulated ground jumper with a straight two hole compression lug on one end and an L-shaped two hole compression lug on

the other end, two plated installation screws, an abrasive pad and a .5 once tube of antioxidant joint compound.

- Ground conductor is an insulated green/yellow stripe #6 AWG wire
- Lugs are made from electroplated tinned copper and have two mounting holes spaces .5" to .625" apart that accept 1/4" screws.
- Jumper will be made with UL Listed components
- Design Make shall be:
- Chatsworth Products, Inc. (CPI),
- Equipment Ground Jumper Kit:
- Part Number 40159-010, Equipment Ground Jumper Kit, 1 each.

B. Communications raceways, backboards and rack systems

- 1. The conduit system must be permanently and effectively grounded, in accordance with Title 24 of the California Code of Regulations, California Electric Code #250, as required by local AHJ. If in confusion or conflict the most stringent specification shall apply.
- 2. Provide as a minimum a #1/0awg THHN conductor in conduit from the main building grounding point to a ½" x 4" x 5.25" telecommunications grounding bus bar(TGB) at every backboard.
- 3. Provide as a minimum #6awg green THHN conductor from each equipment rack, cable tray or wall mounted equipment to a TGB.

PART 3 – EXECUTION

3.1 General

A. Permits and Licensing

- 1. Contractor is responsible to procure all necessary permits before the commencement of their work to the city or state agencies as required. It is the contractor's responsibility to provide all documentation to the AHJ.
- 2. Contractor is responsible to procure all necessary licenses for the city or state they are commencing the work in, before the commencement of their work begins.
- 3. Contractor to procure all encroachment permits as it pertains to the work described in these documents.
- 4. No person may access or enter in any way, an underground vault or confined space without the training, staff, and safety equipment defined on the confined space permit. Accessing these spaces without a valid permit or without the required support services will be cause for an order to stop work until all violations are resolved and may result in a fine or suspension of the workers involved.

B. Safety

1. All federal (OSHA), state, and local safety rules, will be enforced at all times during the duration of the project. It is the responsibility of the Contractor to conduct frequent inspections of the job site to ensure compliance.

3.2 Installation

A. INTRA-BUILDING PATHWAYS

A. COMMUNICATION VAULTS

1. Site Access

• The general contractor shall be responsible for providing adequate access to the site to facilitate hauling, storage and proper handling of the precast concrete units.

2. Installation

- Precast concrete units shall be installed to the lines and grades shown in the contract documents or otherwise specified.
- Precast concrete units shall be lifted by suitable lifting devices at points provided by the precast concrete producer.
- Precast concrete units shall be installed in accordance with applicable industry standards. Upon request, the precast concrete producer shall provide installation instructions.
- Field modifications to the product shall relieve the precast producer of liability regardless if such modifications result in the failure of the precast concrete unit.

3. Watertightness

• Where watertightness is a necessary performance characteristic of the precast concrete unit's end use, watertight joints, pipe-entry connectors and inserts should be used to ensure the integrity of the entire system.

B. CONDUIT

- 1. All conduit shall be routed parallel or perpendicular to walls.
- 2. All conduit shall be installed in accordance with NEMA "Standard of Installation" and shall meet applicable local and California building and electrical codes or regulations.
- 3. Conduit runs shall not exceed 100 feet or contain more than two 90-degree bends without utilizing appropriately sized pull boxes. No conduits may enter a pull box at a 90-degree angle. They are not to be installed into the side of a pull box. All conduits must enter the ends of the pull box.
- 4. All conduits entering a building from outside shall be plugged with reusable stoppers to eliminate the entrance of water or gases into the entrance room. Building entrance conduits shall slope downward away from the building to reduce the potential of water entering the building. All building penetrations are to be sealed from wall to wall and on the outside and inside of the penetrations.
- 5. All conduits penetrating a fire or smoke barrier shall be fully sealed between the conduit and the actual penetration following manufacturer's recommendations.
- 6. Contractor shall label each fire stop location with the manufacturer's identification number of the product used and shall provide the inspector copies of each products system configuration.
- 7. No communications outlet boxes shall be "daisy-chained." Each communications outlet shall be served by a separate 1-inch (minimum) conduit.
- 8. In rooms with a drop or false ceiling, communications outlets shall be served by a 1-inch conduit stubbed six inches above the false ceiling, angled toward the cable tray or open access area, and be equipped with a compression fitting and plastic bushing. All stubs shall be marked "Comm".
- 9. All conduit shall be equipped with an approved water or barrier seal in building access points.
- 10. All conduits which utilize fabric mesh innerduct, willhave the innerduct installed first, and then the appropriate cables installed within the channels of the innerduct.
- 11. No communications conduit shall contain more than 180 degrees of bend without the use of a pullbox. Pullboxes must be approved by Engineer of Record to ensure proper sizing and conduit entry placement.
- 12. In areas where hard lid ceilings are in place, all conduits are to run to accessible location or to cable tray.
- 13. Provide labels at both ends of conduits to identify location of far end.

C. STATION CABLE SUPPORT SYSTEM

- 1. All station cable support systems shall be braced for zone four seismic activity.
- 2. In suspended ceiling and raised floor areas where duct, cable trays, or conduit are not available, station cables shall be bundled with Velcro straps at appropriate distances.
- 3. Velcro straps shall not be over tightened to the point of deforming or crimping the cable sheath.
- 4. Velcro straps shall be UL listed, rated for low smoke, and certified for use in a plenum environment.
- 5. The station cable support system components shall be firmly attached to the existing building structure and installed not more than five feet apart.
- 6. The station cable support system components shall be installed to provide at

- least three (3) inches of clear vertical space between the cables/optics and the ceiling tiles.
- 7. The station cable support system components shall be spaced to prevent the cables/optics from sagging or buckling.
- 8. No more than eighteen (18) Category 6 cables shall be supported by a J hook.
- 9. No more than thirty (30) Category 6 cables shall be supported by triangular galvanized metal bracket.
- 10. The station cable support system shall be clearly and neatly labeled per TIA/EIA 606-A, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.

D. Raceways

- 1. All dual channel raceway shall be installed with a complete end-to-end channel for future power service installation.
- 2. The raceway shall be stubbed above the false ceiling space and capped so that each section of raceway can be connected to a power service in the future without a requirement to add raceway to visible portions of the system. If no false ceiling space is available, the power channel is to be stubbed up and capped next to the point at which the communication services enter the room.

E. Cable Tray

- 1. The Contractor will be responsible for placement of the cable tray in concert with other trades, allowing sufficient room for the cable installers to gain access to all portions of the tray system. Cable tray location shall be coordinated with open ceiling areas, access panel locations, and feeder conduit positions to provide an accessible cable pathway throughout the facility.
- 2. All metallic trays must be grounded and may be used as a ground conductor. Provide #2 AWG bare copper equipment grounding conductor through entire length of tray; bond to each component. Trays used as an equipment grounding conductor must be clearly marked.
- 3. Travs shall be bonded end-to-end.
- 4. Trays shall enter distribution rooms a minimum or six inches into the room, then utilize a drop out to protect station cables from potential damage from the end of the tray.
- 5. Cable trays shall be placed a minimum of six (6) inches from any overhead light fixture and twelve (12) inches from any electrical ballast. A minimum of eight (8) inches of clearance above the tray shall be maintained at all times. All bends and T-joints in the tray shall be fully accessible from above (within 1 foot). Trays shall be mounted no higher than twelve (12) feet above the finished floor and shall not extend more than eight (8) feet over a fixed ceiling area.
- 6. A separate conduit sleeve (minimum of four inches) must be provided as a pathway through any wall or over any obstruction (such as a rated hallway) from the cable tray into any room having a communications outlet.
- 7. The Contractor shall fire stop around the tray and, after installation of the cables, within the tray using removable pillow-style products following manufacturers' guidelines. Sound deadening material shall be provided and installed after installation of cable.
- 8. In rooms without a drop ceiling (open to the structure), the cable shall be mounted as high as possible to provide the greatest clearance above the finished

floor, but within the limits in (e) above.

F. Wire Mesh Cable Tray

- 1. Provide all components of the tray system (tray, supports, splices, fasteners, and accessories) from a single manufacturer.
- 2. Wire mesh cable tray shall be secured to the structural ceiling, building truss system, wall or floor using manufacturer's recommended supports and appropriate hardware as defined by local code or the authority having jurisdiction (AHJ).
- 3. When the pathway is overhead, wire mesh cable tray shall be installed with a minimum clearance of 12" (300 mm) above the tray. Leave 12" (300 mm) in between the tray and ceiling/building truss structure. Multiple tiers of wire mesh cable tray shall be installed with a minimum clearance of 12" (300 mm) in between the trays. When located above an acoustical drop ceiling, wire mesh cable tray shall be installed a minimum of 3" (75 mm) above the drop ceiling tiles.
- 4. When installed under a raised floor, wire mesh cable tray shall be installed with a minimum 3/4" (19 mm) clearance between the top of the tray and the bottom of the floor tiles or floor system stringers, whichever are lower in elevation. Maintain a 3" (75 mm) clearance between trays wherever trays cross over.
- 5. Wire mesh cable tray shall be supported every 6' (1.8 m) of span or less. Support wire mesh cable tray within 2' (0.6 m) of every splice and intersection. Support intersections on all sides. Support wire mesh cable tray on both sides of every change in elevation/direction. The weight of the load on the cable tray must not exceed the stated limits per span in the manufacturer's published load table. Use additional supports where needed.
- 6. Secure wire mesh cable tray to each support with a minimum of one fastener. Follow the manufacturers' recommended assembly, splice and intersection-forming practices.
- 7. Use installation tools and practices recommended by the manufacturer to field fabricate wire mesh cable tray intersections and changes in elevation. Use sideaction bolt cutters with an offset head to cut wire mesh cable tray.
- 8. Wire mesh cable tray shall be bonded to the Telecommunications Grounding Busbar (TGB) using an approved ground lug on the wire basket tray and a minimum #6 grounding wire or as recommended by the AHJ. Follow UL
- 9. Classified splicing methods recommended by the manufacturer, ground the tray per CEC requirements and verify bonds at splices and intersections between individual cable tray sections. Cable pathway should be electrically continuous through bonding and attached to the TGB.
- 10. The quantity of cables within the tray will not exceed a whole number value equal to 50% of the interior area of the tray divided by the cross-sectional area of the cable. Cable fill will not exceed the depth of the cable tray's side rail [2" (50 mm), 4" (100 mm) or 6" (150 mm)].
- 11. The combined weight of cables within the tray will not exceed stated load capacity in manufacturer's specifications.
- 12. Separate different media type within the tray. Treat each type of media separately when determining cable fill limits.
- 13. When pathways for other utilities or building services are within 2' (0.6 m) of the wire mesh cable tray, cover the tray after cables are installed.

G. Pull boxes

- 1. Pull boxes shall be installed in easily accessible locations.
- 2. Pull boxes installed as part of a horizontal cabling pathway shall be installed immediately above suspended ceilings, where possible.
- 3. Pull boxes shall not be used for splicing cable.
- 4. Pull boxes shall be placed in conduit runs that exceed 100 feet or which require more than two 90 degree bends. The pull boxes shall be located in straight sections of conduit and must not be used for a right angle bend. Installation shall allow cable to pass through from one conduit to another in a direct line.
- 5. Pull boxes must have a length at least 12 times the diameter of the largest conduit.

B. EXISTING OUTLET BOXES, RACEWAYS, AND CONDUITS

- A. Existing recessed boxes and concealed station conduits may only be re-used as a pathway for a new outlet per the criteria below:
 - 1. Existing recessed single-gang box with a ¾ inch diameter station conduit: One new voice or data outlet (1 cable maximum).
 - 2. Existing recessed single-gang outlet with a 1 inch diameter station conduit: One new voice/data outlet or one new voice/data/fiber outlet. (3 cables maximum) (Only acceptable in offices and classrooms where wire cannot be fished in existing walls.) For outlets with fiber cable terminations, faceplates must be equipped with a spool to provide for a maintenance loop per manufacturer's specifications.

C. GROUNDING AND BONDING SYSTEMS

A. Grounding and bonding - GENERAL

1. Installation: The Contractor shall provide grounding and bonding in accordance with the requirements of CEC, IEEE 142, TIA/EIA 568, TIA/EIA 607, state and local codes, the campus standards and to requirements specified herein. Codes shall be complied with as a minimum requirement, with these specifications prevailing when they are more stringent.

2. Bonding

- (a) Metallic conduits, wireways, metal enclosures of busways, cable boxes, equipment housings, cable racks and all non-current carrying metallic parts of the installed telecommunications services shall be grounded with #6 AWG copper wire. The metallic conduit system shall be used for equipment and enclosure grounding but not as a system ground conductor.
- (b) All metallic conduit stub-ups shall be grounded, and where multiple stubups are made within an equipment enclosure, they shall be equipped with grounding bushings and bonded together and to the enclosure and the enclosure ground bus.
- (c) Each metallic raceway, pipe, duct and other metal object entering the buildings shall be bonded together. The Contractor shall use #6 AWG bare copper conductors.

(d) The Contractor shall bond telecommunications equipment and busbars separately.

B. Signal Reference Grounding and Bonding

- 1. Each identified telecommunications space within a building shall have a common signal reference ground. The signal reference ground shall conform to the following:
 - (a) Within the building, all communication spaces shall be separately bonded to each other and connected to the primary building ground in accordance with the provisions of TIA/EIA 607. The communication ground shall not ground any other equipment or be connected to any potential high voltage source. All racks, frames, drain wires, and all installed communication equipment shall only be grounded to this common reference ground with a minimum size #6 AWG copper wire.
 - (b) The Contractor shall provide, as a minimum, a continuous #3/0 AWG green electrical conductor connected to a 1/4" x 4" x 5.25" telecommunications grounding bus bar (TGB) 6" AFF on the plywood backboard of each IDF (or telecommunication space) to terminate chassis and other equipment grounds.
 - (c) The ground wires from each individual IDF shall be routed directly to the Building Distribution Frame (BDF), terminated and bonded together via a telecommunications main grounding bus bar (TMGB) of minimum 1/4" x 4" x 12" dimensions. This point of single reference for all closets in a building shall in turn be grounded with a minimum #3/0 AWG ground conductor to the main building ground. If a main building ground is unavailable, the ground wire from the BDF shall be grounded to the nearest electrical panel ground bus bar. The building ground for signal reference shall be the building service entrance ground.

2. Riser/Tie Cable Bonding

- (a) There shall be no bonding between the entry cable and the inside riser or distribution cable.
- (b) All riser and tie cable shields shall be bonded into a single continuous path end-to-end and grounded on each floor in which pairs leave the sheath. Cable shields shall be grounded to the signal reference ground provided in each telecommunication space.

C. Grounding and Bonding Testing and Inspection Procedures

- 1. As an exception to requirements that may be stated elsewhere in these documents, the Inspector of Record shall be given five (5) working days' notice prior to each test. The Contractor shall provide all test equipment and personnel and shall provide written copies of all test results.
- 2. Grounding and bonding system conductors and connections shall be inspected for tightness and proper installation.
- 3. The Contractor shall provide personnel and test equipment for point-to-point resistance tests before connecting equipment. Perform point-to-point tests in each building to determine the resistance between the main grounding system and all BDF/IDF ground bus bars. Investigate and correct point-to-point resistance values that exceed 0.5 ohm. The Contractor shall record resistance

measurements at all test point locations.

D. INFORMATION OUTLETS

A. GENERAL REQUIREMENTS

- 1. Station outlets shall be mounted securely at work area locations.
- 2. Station outlets shall be located so that the cable required to reach the desktop equipment is no more than 10 feet long.
- 3. Station outlets should not be "daisy-chained."
- 4. Outlets shall be mounted as follows:
 - (a) Wall phone: 48 inches above the finished floor.
 - (b) Standard voice/data outlet: 15 inches above the finished floor.
 - (c) Wall-mounted video outlet: 78 inches above the finished floor.
 - (d) Counter top: 6 inches above the counter top.

B. MODULAR FURNITURE TELECOMMUNICATIONS OUTLETS

- 1. The Contractor shall provide and install all components and labor necessary to completely install, test, and document voice and data telecommunications outlets at each modular furniture workstation location.
- 2. Category 6 station cable shall be placed from the BDF, through the riser sleeves, through the cable tray system into the conduit, ceiling or floor poles, etc. into the furniture to be served.
- 3. The Contractor shall coordinate the telecommunications and electrical installation so that the modular furniture is served from the joint signal/power floor monuments or joint power pole in a consistent manner. The Contractor shall provide and install all fittings, flex conduit, adapter plates, and telecommunications cable and components necessary to install Category 6 station cable from the consolidation point box, through the ceiling or floor monument or pole, into the furniture raceway, and to the final user outlet location (including jacks, adapters, and faceplates).
- 4. The telecommunications installers shall coordinate with the electrical drawings for the number and location of user voice and data outlets.
- 5. Labels shall be numbered according to a scheme developed in consultation with the owner's representative. Owner to approve label scheme prior to printing.

E. GROUNDING AND BONDING

- 1. The facility shall be equipped with a Telecommunications Bonding Backbone (TBB). This backbone shall be used to ground all telecommunications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has the potential to act as a current carrying conductor.
- 2. The TBB shall be installed independent of the building's electrical and building ground and shall be designed in accordance with the recommendations contained in the ANSI/TIA/EIA-607 Telecommunications Bonding and Grounding Standard.
- 3. The main entrance facility/equipment room in each building shall be equipped with a telecommunications main grounding bus bar (TMGB).
- 4. The TMGB shall be connected to the building electrical entrance grounding facility. The intent of this system is to provide a grounding system that is equal in potential to the building electrical ground system. Therefore, ground loop

- current potential is minimized between telecommunications equipment and the electrical system to which it is attached.
- 5. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. shall be grounded to the respective TGB or TMGB using a minimum #6 AWG stranded copper bonding conductor and compression connectors.
- 6. All wires used for telecommunications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape.
- 7. All cables and bus bars shall be identified and labeled in accordance with the System Documentation Section of this specification.
- 8. Wall-Mount Busbars
 - Attach busbars to the wall with appropriate hardware according to the manufacturer's installation instructions.
 - Conductor connections to the TMGB or TGB shall be made with two-hole bolt-on compression lugs sized to fit the busbar and the conductors.
 - Each lug shall be attached with stainless steel hardware after preparing the bond according to manufacturer recommendations and treating the bonding surface on the busbar with antioxidant to help prevent corrosion at the bond.
 - The wall-mount busbar shall be bonded to ground as part of the overall Telecommunications Bonding and Grounding System.
- 9. Rack-Mount Busbars and Ground Bars
 - When a rack or cabinet supports active equipment or any type of shielded cable or cable termination device requiring a ground connection, add a rackmount horizontal or vertical busbar or ground bar to the rack or cabinet. The rack-mount busbar or ground bar provides multiple bonding points on the rack for rack and rack-mount equipment.
 - Attach rack-mount busbars and ground bars to racks or cabinets according to the manufacturer's installation instructions.
 - Bond the rack-mount busbar or ground bar to the room's TMGB or TGB with appropriately sized hardware and conductor.
- 10. Ground Terminal Block
 - Every rack and cabinet shall be bonded to the TMGB or TGB.
 - Minimum bonding connection to racks and cabinets shall be made with a rack-mount two-hole ground terminal block sized to fit the conductor and rack and installed according to manufacturer recommendations.
 - Remove paint between rack/cabinet and terminal block, clean surface and use antioxidant between the rack and the terminal block to help prevent corrosion at the bond.

11. Pedestal Clamp

- At minimum, bond every sixth raised access floor pedestal with a minimum #6 AWG conductor to the TMGB or TGB using a pedestal clamp sized to fit the pedestal and the conductor and installed according to the manufacturer's recommendations.
- If pedestal clamps are used to construct a signal reference grid, bond the signal reference grid to the TMGB or TGB and bond each rack and/or cabinet to the signal reference grid using a compression tap or similar nonreversible bonding component sized to fit both conductors.
- Remove paint between the pedestal and pedestal clamp, clean surface and use antioxidant between the pedestal and the clamp to help prevent corrosion at the bond.

• Remove insulation from conductors where wires attach to the pedestal clamp.

12. Pipe Clamp

- Bond metal pipes located inside the data center computer room with a minimum #6 AWG conductor to the TMGB or TGB using a pipe clamp sized to fit the pipe and the conductor and installed according to the manufacturer's recommendations.
- Remove paint between the pipe and pipe clamp, clean surface and use antioxidant between the pipe and the clamp to help prevent corrosion at the bond
- Remove insulation from conductors where wires attach to the pipe clamp.

13. Equipment Ground Jumper Kit

- Bond equipment to a vertical rack-mount busbar or groundbar using ground jumper according to the manufacturer's recommendations.
- Clean the surface and use antioxidant between the compression lugs on the jumper and the rack-mount busbar or groundbar to help prevent corrosion at the bond.

F. FIRE STOP SYSTEM

- 1. The 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.
- 2. Fire stop 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 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.
- 4. Fire stop systems shall be UL Classified to ASTM E814 (UL 1479).

3.3 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 construction 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 As-Built drawings are to include conduit routes, utility vault/pull box locations, surface mount enclosure locations, PVC to GRC transition points and the approved

labeling identifiers. 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.

END OF SECTION

(THIS PAGE LEFT INTENTIONALLY BLANK)

SECTION 271000 - STRUCTURED CABLING SYSTEM

PART 1 – GENERAL

1.1 Scope of Work

- A. This document describes the requirements for the contractors, products and installation relating to furnishing and installing a Structured Cabling Plant.
- B. The Cabling System as described in this document is comprised of cabling, infrastructure and termination hardware to provide an approved TIA/EIA Data Networking and Voice Communication Structured Cabling System.
- C. 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.
- D. 271000 contractors shall be complete with work including all testing and labeling prior to 272000 contractor work start. Owner requires a minimum of 5 days to review test documents prior to network start up.

1.2 Contractor Qualifications/Quality Assurance

A. Safety and Indemnity

1. Contractors will submit the necessary documentation to demonstrate their compliance with Section 270000 "1.5 A. Safety & Indemnity".

B. Contractor Qualifications

1. Contractors will submit the necessary documentation to demonstrate their compliance with Section 270000 "1.5 B. Contractor Qualification".

C. Ouality Assurance

1. Contractor shall comply with all requirements as specified in Section 270000 "1.5 Quality Assurance".

D. Warranty

- 1. Contractor shall comply with all requirements as specified in Section 270000 "1.8. Acceptance & Warranties".
- 2. The bid package shall be accompanied by a warranty commitment binding the awarded contractor and manufacturer to a Lifetime Structured Cabling Warranty with guaranteed performance criteria set forth in this document and/or set forth by the Manufacturer. Contractor must be trained and certified in the installation of the Manufacturer system proposed. Contractor shall submit proof of current certification in the Certified Installer Program as a Premier or Authorized Network Installer in order to install and fully warrant the Cabling System. Copy of current Certificate must be included in Proposal if not already on file with Architect/Consultant/Owner.
- 3. A Lifetime warranty (or 25yr minimum) for the structured cabling system shall be provided for an end-to-end permanent link model installation which covers the performance of the cable, connecting hardware and the labor cost for the repair or replacement of the link.
- 4. Links failing test parameters or producing marginal pass results will be retested

- or replaced at Contractor expense until link test results passing TIA/EIA Standard parameters for the category rating or better are achieved.
- 5. Warranty application is to be submitted in advance of the project start, and full test reports shall be delivered to Manufacturer within 15 days of project completion. Lifetime Manufacturer warranty processing is to be completed by Contractor and warranty certificate delivered to owner upon project completion.

1.3 Submittal Documentation

A. The successful contractor shall provide their submittal package in accordance with the Section 01 20 00 1.06 Submittal Schedule, and Section 270000 "1.6 Submittal Documentation".

1.4 Equivalent Products

- A. All Products Leviton, Berk-Tek, Superior Essex, and Chatsworth form the basis of design for this Specification. Part numbers, where provided, exemplify the feature set expected to be provided for this Structured Cabling Plant.
- B. Pre-Approved Equals:
 - 1. None, all alternate materials must be submitted for approval prior to bid.
- C. Structured cabling manufacture system warranties shall be Limited Lifetime or 25-year.
- D. Contractors wishing to approve a system other than those specified in this document shall do so in accordance with Section 270000 "1.7 Equivalent Products".

1.5 Typical configurations

- A. All room configurations are based on the "Learning Wall" and entry door. All locations shall be installed per plan. Classrooms shall have on average 17 Cat6 cables in each room:
 - 1. Entry door shall have ONE Cat6 cable for IP wall phone (one voice).
 - 2. Four (4) Cat6 cables, with two on each side of the whiteboard (two data, two voice)
 - 3. Student work area shall have eight (8) Cat6 cables (8 data)
 - 4. Ceiling area shall have four (4) Cat6 cables (one for the A/V projector, one for the A/V switcher, and two for wireless access point). A red colored dot is to be placed on the ceiling grid to mark the location of these four cables.
 - 5. Depending on the orientation of the room, two additional Cat6 cables may be added to allow for teacher flexibility.
- B. Computer labs shall have 48 Cat6 cables in each room
 - 1. Entry door shall have ONE Cat6 cable for IP wall phone (one voice).
 - 2. Computer labs shall have FORTY Cat6 cables.
 - 3. Standard A/V classroom install is included: A/V Control Panel, two input modules, and either wall or pole mounts.
 - 4. Ceiling area shall have four Cat6 cables (one A/V projector, one A/V switcher, two wireless access point). A red colored dot is to be placed on the ceiling grid to mark the location of these four cables.

- 5. Three Cat6 for the teacher (phone, computer, and printer).
- C. All rooms shall be field verified prior to installation.

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:
 - Patch Cords
 - Modular Inserts and Jacks
 - Faceplates
 - 1. Category 6 and Category 6A Outlet Patch Cords
 - OWNER PROVIDED
- B. Modular Inserts and Jacks
 - 1. Category 6A Keystone Jack (for Wireless and other uses as specified)
 - Jacks must meet or exceed the Category 6A standard.
 - Jacks shall be 8-position 8-conductor RJ45-style and must have "retention- force technology" or equivalent feature to prevent time damage over the life of the jack regardless of use
 - Jacks shall be 8 position un-keyed
 - Jack shall be rear-terminated industry- standard 110 IDC. Lead-frame jacks shall not be used in this Cable Plant.
 - Jacks shall have a designation indicating Category 6A on the nose which can be plainly seen from the front of the faceplate. Bottom of jack shall have date code.
 - 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.
 - Jacks shall terminate 22-26 AWG stranded or solid conductors.
 - Jacks shall be compatible with single conductor 110 impact termination tools.
 - Jacks shall have an attached color coded wiring instruction label housed between the IDC termination towers.
 - Jacks shall be manufactured in the USA
 - Jacks shall be compatible with TIA/EIA 606 color code, and have removable high-visibility color labels designating pair locations. Split-colored T568A/B labels are not approved.
 - Jacks shall utilize pair-separation towers for ease of untwisting pairs, and shall employ a snap-on rear termination cover designed for suppression and isolate of cross-talk of neighboring connectors.
 - Jacks will be terminated according to the T568B wiring scheme.
 - Color:

Data Jacks will be BLUE Voice Jacks will be WHITE Wireless Jacks will be YELLOW A/V Jacks will be GRAY Camera Jacks will be PURPLE

• Quantity: Contractor will provide and install one jack for every outlet cable shown on the drawings.

Part#:

Data Jacks will be 61110-RL6 Voice Jacks will be 61110-RW6 Wireless Jacks will be 61110-RY6 A/V Jacks will be 61110-RG6 Camera Jacks will be 61110-RP6

- 2. Category 6 Keystone Jack (for General-Purpose Data/Voice applications)
 - Jacks must exceed the Category 6 standard, and must be Component-Rated for performance.
 - Jacks shall be 8-position 8-conductor RJ45-style and must have "retention- force technology" or equivalent feature to prevent time damage over the life of the jack regardless of use
 - Jacks shall be 8 position un-keyed
 - Jack shall be rear-terminated industry- standard 110 IDC. Lead-frame jacks shall not be used in this Cable Plant.
 - 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.
 - 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.
 - Jacks shall terminate 22-26 AWG stranded or solid conductors.
 - Jacks shall be compatible with single conductor 110 impact termination tools.
 - Jacks shall have an attached color coded wiring instruction label housed between the IDC termination towers.
 - Jacks shall be manufactured in the USA
 - Jacks shall be compatible with TIA/EIA 606 color code, and have removable high-visibility color labels designating pair locations. Split-colored T568A/B labels are not approved.
 - Jacks shall utilize pair-separation towers for ease of untwisting pairs, and shall employ a snap-on rear termination cover designed for suppression and isolate of cross-talk of neighboring connectors.
 - Jacks will be terminated according to the T568B wiring scheme.
 - Color:

Data Jacks will be BLUE Voice Jacks will be WHITE Wireless Jacks will be YELLOW A/V Jacks will be GRAY Camera Jacks will be PURPLE

• Quantity: Contractor will provide and install one jack for every outlet cable shown on the drawings.

Part#:

Data Jacks will be 61110-RL6 Voice Jacks will be 61110-RW6 Wireless Jacks will be 61110-RY6 A/V Jacks will be 61110-RG6 Camera Jacks will be 61110-RP6

C. Wall Mount and Modular Furniture Faceplates

- 1. Wall Plates
 - Faceplates shall be UL Listed and CSA Certified
 - Faceplates shall be 2.75" W x 4.5" H (69.8 mm x 114.3 mm)
 - Faceplates shall provide for TIA/EIA 606 compliant station labeling.
 - Faceplates shall have plastic covers over the mounting screws that can be replaced with a clear plastic window over a printable paper insert.
 - Faceplates shall have an industry-standard KEYSTONE opening style, and shall accept any Keystone modular insert.
 - Faceplates shall be made in the U.S.A.
 - Color: Faceplate to be WHITE
 - Quantity: Contractor will provide and install one single gang faceplate for each outlet shown on the drawings.
 - Part#:

6 Port Face Plate, PN# 42080-6WS 4 Port Face Plate, PN# 42080-4WS 2 Port Face Plate, PN# 42080-2WS

- 2. Blank Insert
 - Color: Blank Insert to match device place or raceway.
 - Quantity: Contractor will provide and install one insert for every unused port in a faceplate.
 - □ Part#: 41084-B*B
- 3. Blank Wall Plates
 - Faceplate shall be constructed from stainless steel.
 - Faceplates shall be UL Listed and CSA Certified
 - Faceplates shall be 2.75" W x 4.5" H (69.8 mm x 114.3 mm) for single gang.
 - Color: Faceplate to be STAINLESS STEEL
 - Quantity: Contractor will provide and install one faceplate for each unused data/voice/video/intercom outlet shown on the drawings.
 - □ Part#: 84014-40
- 4. Surface Mount Raceway Insert

Inserts for Wiremold's 4050, 5450 and 5550 Device Mounting Brackets

- Insert shall allow for two category 6 jacks to be mounted flush.
- Insert shall match the color of the Raceway installed.
- Color: Faceplate to be IVORY
- Quantity: Contractor will provide and install one 2-port insert for each outlet in the Surface Mount Raceway shown on the drawings.
- Part#: Equal to Wiremold, PN# 5507-FRJ

2.2 Horizontal Distribution Cabling

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

(TR).

- Cabling Support System Copper Station Cabling
- Copper Cross-Connect Cabling

Copper Station Cable A.

- 1. Category 6A Unshielded Twisted Pair (UTP) Cable
 - Cable will meet or exceed the proposed requirements of ANSI/TIA 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, PSANEXT, and Delay Skew.
 - Cable shall be proven to support 10 Gigabit Ethernet / 10GBASE-T, Gigabit Ethernet / IEEE 802.3an, 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.
 - The cable shall consist of four unshielded twisted pairs of thermoplastic insulated bare copper enclosed in a thermoplastic jacket.
 - All cable shall conform to the requirements for communications circuits defined by the California Electrical Code (Article 800) and the Canadian Building Code. Cable listed to CEC Article 800-51(a) will be used for "Plenum" installations. Cable listed to CEC Article 800-51(b) shall be installed in vertical runs penetrating more than one floor.
 - Cable shall have been certified with the UL 1666 Vertical Tray Flame Test.
 - Cable shall be available in a Plenum, Riser and Indoor/Outdoor rated jackets.
 - Contractor will use the indoor/outdoor rated cable for all locations where the cable pathway goes underground and/or run in exterior conduit.
 - Cables shall be made in the U.S.A.
 - The listed Category 6A cables in this specification are manufactured by Berk- Tek
 - Color:

Data cable jacket will be BLUE

Data cable for Security Cameras will be PURPLE

- Quantity: See Drawing for quantity and installation details.
- Part#:

For Riser Application:

Berk-Tek LANmark-10G2, PN# 11084689

For Plenum Application:

Berk-Tek LANmark-10G2, PN# 11085339

For Indoor/Outdoor

Application: Berk-Tek

LANmark 10G OSP

- 2. Category 6 Unshielded Twisted Pair (UTP) Cable
 - Cable will meet or exceed the proposed requirements of ANSI/TIA/EIA 568- C.2, 568-B.2 Addendum #1 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.
 - 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.

- The cable shall consist of four unshielded twisted pairs of thermoplastic insulated bare copper enclosed in a thermoplastic jacket.
- All cable shall conform to the requirements for communications circuits defined by the California Electrical Code (Article 800) and the Canadian Building Code. Cable listed to CEC Article 800-51(a) will be used for "Plenum" installations. Cable listed to CEC Article 800-51(b) shall be installed in vertical runs penetrating more than one floor.
- Cable shall have been certified with the UL 1666 Vertical Tray Flame Test.
- Cable shall be available in a Plenum, Riser and Indoor/Outdoor rated jackets.
- Contractor will use the indoor/outdoor rated cable for all locations where the cable pathway goes underground and/or run in exterior conduit.
- Cables shall be made in the U.S.A.
- The listed Category 6 cables in this specification are manufactured by Berk- Tek
- Color:

Data cable jacket will be BLUE Data cable for Security Cameras will be PURPLE

- Quantity: See Drawing for quantity and installation details.
- Part#:

For Riser Application:

Superior Essex PN# 77-240-2A or Berk-Tek PN# 10136339

For Plenum Application:

Superior Essex PN# 77-240-2B or Berk-Tek PN# 10136226

For Indoor/Outdoor Application:

Mohawk CDT PN# M58772 (all cable jackets will be BLACK)

- B. Horizontal Copper Cross-Connect Cabling
 - 1. Voice Cross-Connect Cabling
 - Cable shall meet and/or exceed the UL Listed Type CMR and the ANSI/ICEA S-80-576 standard.
 - Cables shall be made in the U.S.A.
 - Core Construction
 - Conductors: Solid-copper conductors, 24 AWG.
 - Insulation: Flame retardant semi-rigid PVC.
 - 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.
 - Jacket: Gray, flame retardant PVC jacket.
 - Color: Voice cable jacket will be GRAY
 - 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.
 - Part#:
 - Superior Essex Cable:

Berk-Tek:

25 pair = PN# 18-475-33	10032396
50 pair = PN# 18-579-33	10032471
100 pair = PN# 18-789-33	10032472

2.3 Backbone Cabling

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).

- Fiber Optic Backbone Cabling
- Copper Backbone Cabling
- A. Fiber Optic Backbone Cabling
 - 1. Data System Backbone Cabling
 - Cable shall be UL/cUL OFNR/OFN FTA rated and be Flame Resistant in accordance with the UL 1666.
 - Cable shall an OSP.
 - Cable shall be constructed utilizing a loose tube design.
 - Cable will be fully water blocked combining overall water blocking tape and a moisture blocking gel for each individual tube.
 - Cable will maintain the following:
 - Crush Resistance (EIA-455-41) = 2000 N/cm
 - Impact Resistance (EIA-455-25) = 2000 Impacts w/1.6 N-m
 - Min Bend Radius:

Long Term - No Load = 15x Cable diameter Short Term - Load = 20x Cable diameter

- Operating Temp. = -40° C to $+70^{\circ}$ C
- Storage Temp. = -40° C to $+80^{\circ}$ C
- Cable shall be constructed of 50/125μ Laser Optimized rated glass capable of:

1 Gigabit Ethernet Link at 1000m/600m (@850nm/1300nm) 10 Gigabit Ethernet Link at 300m/300m (@850nm/1300nm)

- ALL FIBER SHALL BE FUSION SPLICED
- The Fiber Optic Cable in this specification is manufactured by Berk-Tek
- Color: Fiber Optic cable jacket will be Black
- Quantity: See Drawing for quantity and installation details.
- NOTE: HYBRID CABLES ARE PREFERRED OVER SEPARATE RUNS OF EACH TYPE OF CABLE. PROVIDE JUSTIFICATION IF YOU ARE NOT ABLE TO USE THE HYBRID CABLE.
- THE CABLES LISTED BELOW ARE ARMORED CABLE.
 CONTRACTOR IS REPOSNBILE TO VERIFY DIAMETER OF
 CABLES NEEDED VERSUS AVAILBLE CONDUIT PATHWAY.
 ARMORED CABLE IS PREFERRED FOR ANY CABLING BETWEEN
 BULDINGS. IF ARMORED CABLE CANNOT BE USED,
 CONTRACTOR TO NOTIFY OWNER IN WRITING AT A
 MIMUMUM OF 30 WORKING DAYS PRIOR TO CABLE
 INSTALLATION.
- Field Breakout Kits: Leviton PN# 49887-12S is to be used for all cables more than 6 strands. Six strand cables will use 49887-06S. Provide two

kits per buffer tube to be terminated.

<u>6 Strand Armored Single Mode Fiber (needs two breakout kits)</u> Equal to Berk-Tek, PN# OPRK006AB0403

.

12 Strand Armored Single Mode Fiber (needs two breakout kits) Equal to Berk-Tek, PN# OPRK012AB0403

<u>24 Strand Armored Single Mode Fiber</u> (needs four breakout kits) Equal to Berk-Tek, PN# OPRK12B024AB0403

36 Strand Armored Single Mode Fiber (needs six breakout kits) Equal to Berk-Tek, PN# OPRK12B036AB0403

48 Strand Armored Single Mode Fiber (needs eight breakout kits) Equal to Berk-Tek, PN# OPRK12B048AB0403

<u>60 Strand Armored Single Mode Fiber</u> (needs ten breakout kits) Equal to Berk-Tek, PN# OPRK12B060AB0403

<u>72 Strand Armored Single Mode Fiber</u> (needs twelve breakout kits) Equal to Berk-Tek, PN# OPRK12B072AB0403

<u>6 Strand Armored Multi Mode Fiber (needs two breakout kits)</u> Equal to Berk-Tek, PN# OPRK006EB3010/25

12 Strand Armored Multi Mode Fiber (needs two breakout kits) Equal to Berk-Tek, PN# OPRK012EB3010/25

<u>24 Strand Armored Multi Mode Fiber</u> (needs four breakout kits) Equal to Berk-Tek PN#OPRK12B024EB3010/25

36 Strand Armored Multi Mode Fiber (needs six breakout kits) Equal to Berk-Tek PN#OPRK12B036EB3010/25

48 Strand Armored Multi Mode Fiber (needs eight breakout kits) Equal to Berk-Tek PN#OPRK12B048EB3010/25

<u>60 Strand Armored Multi Mode Fiber</u> (needs ten breakout kits) Equal to Berk-Tek PN#OPRK12B060EB3010/25

<u>72 Strand Armored Multi Mode Fiber (needs twelve breakout kits)</u> Equal to Berk-Tek PN#OPRK12B072EB3010/25

<u>Hybrid 6 Armored Strand Multi Mode, 6 Strand Single Mode</u> <u>Fiber</u> (needs 2 breakout kits) Equal to Berk-Tek, PN# OPRK012-006EB3010/25-006AB0403

Hybrid 12 Armored Strand Multi Mode, 12 Strand Single Mode Fiber (needs 4 breakout kits)

Equal to Berk-Tek, PN# OPRK12B024-012EB3010/25-012AB0403

<u>Hybrid 18 Armored Strand Multi Mode, 18 Strand Single Mode Fiber</u> (needs 6 breakout kits)

Equal to Berk-Tek, PN# OPRK12B036-018EB3010/25-018AB0403

<u>Hybrid 24 Armored Strand Multi Mode, 24 Strand Single Mode Fiber</u> (needs 8 breakout kits)

Equal to Berk-Tek, PN# OPRK12B048-024EB3010/25-024AB0403

Hybrid 36 Armored Strand Multi Mode, 36 Strand Single Mode Fiber (needs 12 breakout kits)

Equal to Berk-Tek, PN# OPRK12B072-036EB3010/25-036AB0403

<u>Hybrid 48 Armored Strand Multi Mode, 48 Strand Single Mode Fiber</u> (needs 16 breakout kits)

Equal to Berk-Tek, PN# OPRK12B096-048EB3010/25-048AB0403

<u>Hybrid 60 Armored Strand Multi Mode, 60 Strand Single Mode Fiber</u> (needs 20 breakout kits)

Equal to Berk-Tek, PN# OPRK12B120-060EB3010/25-060AB0403

<u>Hybrid 72 Armored Strand Multi Mode, 72 Strand Single Mode Fiber</u> (needs 24 breakout kits)

Equal to Berk-Tek, PN# OPRK12B144-072EB3010/25-072AB0403

NON-ARMORED CABLE – NOTIFY OWNER WITH JUSTIFICATION AS TO WHY THE NON-ARMORED CABLE IS RECOMMEND FOR USE BY CONTRACTOR AT LEAST 30 WORKING DAYS PRIOR TO SCHEDULE INSTALLATION.

<u>6 Strand Single Mode Fiber (needs two breakout kits)</u> Equal to Berk-Tek, PN# OPR006AB0403

.

12 Strand Single Mode Fiber (needs two breakout kits) Equal to Berk-Tek, PN# OPR012AB0403

24 Strand Single Mode Fiber (needs four breakout kits) Equal to Berk-Tek, PN# OPR12B024AB0403

36 Strand Single Mode Fiber (needs six breakout kits) Equal to Berk-Tek, PN# OPR12B036AB0403

48 Strand Single Mode Fiber (needs eight breakout kits) Equal to Berk-Tek, PN# OPR12B048AB0403

<u>60 Strand Single Mode Fiber (needs ten breakout kits)</u> Equal to Berk-Tek, PN# OPR12B060AB0403

72 Strand Single Mode Fiber (needs twelve breakout kits)

Equal to Berk-Tek, PN# OPR12B072AB0403

<u>6 Strand Multi Mode Fiber</u> (needs two breakout kits) Equal to Berk-Tek, PN# OPR006EB3010/25

12 Strand Multi Mode Fiber (needs two breakout kits) Equal to Berk-Tek, PN# OPR012EB3010/25

<u>24 Strand Multi Mode Fiber</u> (needs four breakout kits) Equal to Berk-Tek PN#OPR12B024EB3010/25

36 Strand Multi Mode Fiber (needs six breakout kits) Equal to Berk-Tek PN#OPR12B036EB3010/25

48 Strand Multi Mode Fiber (needs eight breakout kits) Equal to Berk-Tek PN#OPR12B048EB3010/25

<u>60 Strand Multi Mode Fiber</u> (needs ten breakout kits) Equal to Berk-Tek PN#OPR12B060EB3010/25

72 Strand Multi Mode Fiber (needs twelve breakout kits) Equal to Berk-Tek PN#OPR12B072EB3010/25

Hybrid 6 Strand Multi Mode, 6 Strand Single Mode Fiber (needs 2 breakout kits)
Equal to Berk-Tek, PN# OPR012-006EB3010/25-006AB0707

Hybrid 12 Strand Multi Mode, 12 Strand Single Mode Fiber (needs 4 breakout kits)
Equal to Berk-Tek, PN# OPR024-012EB3010/25-012AB0403

Hybrid 18 Strand Multi Mode, 18 Strand Single Mode Fiber (needs 6 breakout kits)

Figure 1 to Pork Tak, PN# OPP036 018FP3010/25 018 A P046

Equal to Berk-Tek, PN# OPR036-018EB3010/25-018AB0403

Hybrid 24 Strand Multi Mode, 24 Strand Single Mode Fiber (needs 8 breakout kits)
Equal to Berk-Tek, PN# OPR048-024EB3010/25-024AB0403

Hybrid 36 Strand Multi Mode, 36 Strand Single Mode Fiber (needs 12 breakout kits)
Equal to Berk-Tek, PN# OPR12B072-036EB3010/25-036AB0403

<u>Hybrid 48 Strand Multi Mode, 48 Strand Single Mode Fiber</u> (needs 16 breakout kits) Equal to Berk-Tek, PN# OPR12B096-048EB3010/25-048AB0403

<u>Hybrid 60 Strand Multi Mode, 60 Strand Single Mode Fiber</u> (needs 20 breakout kits) Equal to Berk-Tek, PN# OPR12B120-060EB3010/25-060AB0403 <u>Hybrid 72 Strand Multi Mode, 72 Strand Single Mode Fiber</u> (needs 24 breakout kits) Equal to Berk-Tek, PN# OPR12B144-072EB3010/25-072AB0403

B. Copper System Backbone Cabling

- 1. Voice System Backbone Cabling
 - Cable shall meet or exceed those specified in RUS Bulletin 1753F-208 (REA PE-89)
 - Cables shall be made in the U.S.A.
 - Core Construction
 - Conductors: Solid, annealed copper, 24 AWG unless otherwise noted on design documents.
 - Insulation: Dual insulation consisting of an inner layer of foamed polyolefin skin, colored coded in accordance with industry standards
 - Core Assembly: Cables of 25 pairs and less formed by assembling pairs together in a single group. Cables of more than 25 pairs formed by twisted pairs arranged in groups with each group having a color coded unit binder.
 - Filling Compound: The entire core assembly completely filled with ETPR compound, filling the interstices between the pairs and under the core tape.
 - Core Wrap: Non-hygroscopic dielectric tape applied longitudinally with an overlap.
 - Sheath Construction
 - Aluminum Shield: Corrosion protected plastic coated, corrugated 0.008" aluminum tape.
 - Jacket: Black, linear low-density polyethylene.
 - Color: Voice cable jacket will be BLACK
 - 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 serving the individual telephone handsets by 1.25 to the nearest 25-pair increment.
 - Part#: Equal to Superior Essex Cable: 25 pair = PN# 09-097-02 50 pair = PN# 09-100-02 100 pair = PN# 09-104-02 200 pair = PN# 09-108-02

2.4 Telecommunication Room

The Telecommunication Room (TR) includes those products that terminate horizontal and backbone cabling subsystems and connect then to the network equipment.

- Patch Cords
- Horizontal Cabling Termination Equipment
- Backbone Cabling Termination Equipment
- Cabinets, Racks, and Enclosures
- Cable Support System

A. Patch Cords

- 1. Copper Patch Cords
 - 1.1 Category 6 and Category 6A Data/Voice TR Patch Cords
 - OWNER PROVIDED

- 1.2 Data to Voice TR Patch Cords
- OWNER PROVIDED
- 2. Fiber Patch Cords
 - 2.1 Fiber Optic TR Multimode Patch Cords
 - OWNER PROVIDED
 - 2.2 Fiber Optic TR Singlemode Patch Cords
 - OWNER PROVIDED
- B. Horizontal Cable Termination Equipment
 - 1. Copper Termination Equipment
 - 1.1 Data Category 6 and 6A Patch Panels
 - Panels shall be made of black 16-gauge steel in 24 port configurations.
 - 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.
 - Panels shall have write-on blocks and port numbers are silk-screened in white.
 - Panels shall provide wiring identification & color code and maintain an inline, paired punch down sequence that does not require the splitting of conductors from individual cable pairs.
 - The panel shall accept all QuickPort modules and feature white write-on front labels.
 - Panels shall be ANSI/TIA/EIA-568-C.1, C.2 and ISO/IEC 11801 category 6 compliant.
 - Panels shall be UL LISTED 1863 and CSA certified.
 - Panels shall be made by an ISO 9002 Certified Manufacturer.
 - Panels shall be made in the U.S.A.
 - Color: Patch Panel shall be BLACK
 - 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.
 - Part#:

24-port Category 6 patch panel, angled recessed, 4W256-H24

INSTALLATION NOTE: When installing the 24-port patch panel, install two together and provide 1U of rack space for equipment installation then two panels, 1U of space, etc. VERIFY WITH OWNER RACK/CABINET LAYOUT PRIOR TO INSTALLATION.

- 1.2 Voice Termination Block (Intercom Backbone and Intercom Devices)
- Pair Capacity 50
- Blocks shall be wall mounted.
- Terminates 22 26 AWG (0.81 0.41mm) solid insulated cable or 18 19 AWG (1.02 0.91mm) solid stripped cable
- Blocks shall have stand-off legs included for all locations; S89 series stand- off bracket
- Made from High impact flame retardant thermoplastic

- ☐ Height: 254mm (10 in.), width: 86.4mm (3.4 in.), depth: 30.5mm (1.2 in.)
- Part#: Leviton or equal Termination block, 40066-M50 Mounting bracket, 40089-00D

C. Backbone Cable Termination Equipment

1. Connectors

- 1.1 Fiber Optic Connectors
- Anaerobic & Mechanical terminations will not be accepted.
- 1.2 Fusion-Fiber Pigtail Fusion Splice Module
- Integrated module adapter bulkhead for 12 or 24 fibers with selfcontained splice holders
- Individual compartments provide slack storage and bend radius guides for respective backbone cable, 900μm tight buffer pigtails, and fusion spliced fibers
- 12-fiber color-coded 900µm tight buffer pigtails 1.5m length are preloaded in module per specific configuration
- Modular design allows for ease of maintenance of individual spliced fiber and allows for scaling up without impacting existing fibers
- Included accessory kit consists of heat shrink style splice sleeves, tie wraps, and mesh sleeve
- Installs in Leviton's Opt-X rack mount (Ultra, 1000i, and 500i) and wall mount fiber enclosures
- Zirconia ceramic ferrules and sleeves used
- 12-fiber splice module configurations will utilize duplex LC adapters
- 24-fiber splice module configurations will utilize quad LC adapters
- ALL FIBER SHALL BE FUSION SPLICED
- Quantity: See Drawing for quantity and installation details.
- Part #: Leviton or equal
- 12-strand Singlemode, SPLCS-12L
- 24-strand Singlemode, SPLCS-24L
- 12-strand Singlemode Fusion Splice pigtail kit, UPPLC-KIT

2. Fiber Termination Panels

- 2.1 IDF Rack Mount Fiber Panel
- Fiber panels shall be constructed of durable polycarbonate plastic and black powder-coated 16-gauge steel
- Panel shall have a sliding tray which removes completely from enclosure to facilitate field terminations and splicing
- Sliding tray with front and rear stop shall glide forward and backward providing accessibility to front and rear of bulkhead after installation
- Panel shall have a 17" depth for high-density fiber termination and/or splicing
- Front saddles shall pivot for improved patch cord routing and organization
- Removable transparent hinged doors and slide-away covers shall allow for easy access during install and visibility of interior after install
- Panel shall employ patch cord bend radius guides to minimize macro bending

- Stackable and adjustable fiber rings simplify cable management
- Panel shall be no more than 1 rack unit in height and shall hold up to
 3 adapter plates.
- Panel shall be Made in the U.S.A
- ALL FIBER SHALL BE FUSION SPLICED
- COLOR: black with translucent blue cover panels
- Quantity: See Drawing for quantity and installation details.
- Part#: Leviton Opt-X SDZ 2000i no exceptions 1U - 5R1UH-S03

2.2 IDF Wall Mount Fiber Enlosure

- Panels shall be constructed of cold rolled 16 gauge steel with a black powder paint finish and provide for fully enclosed fiber termination.
- Panel shall have a door design. One door shall be lockable for the "technician side" that secures the incoming and outgoing fiber cables. The second door shall accessible to provide fiber patching as needed.
- Panels shall accept four adapter panels for 24 port configurations.
- Panels shall have a splice tray mounting stud incorporated into the base for mounting of mechanical or fusion splice trays. Panel shall have cable management anchor points and come with cable anchors allowing for the maintenance of the incoming cable with the proper minimum bend radius.
- Panels shall have cable entrance ports on the top and bottom with removable plastic dust covers.
- ALL FIBER SHALL BE FUSION SPLICED
- Color: Fiber Panel will be BLACK
- Quantity: See Drawing for quantity and installation details.
- ☐ Part: 5W320-00N

2.3 MDF Rack Mount Fiber Panel

- Fiber panels shall be constructed of durable polycarbonate plastic and black powder-coated 16-gauge steel
- Panel shall have a sliding tray which removes completely from enclosure to facilitate field terminations and splicing
- Sliding tray with front and rear stop shall glide forward and backward providing accessibility to front and rear of bulkhead after installation
- Panel shall have a 17" depth for high-density fiber termination and/or splicing
- Front saddles shall pivot for improved patch cord routing and organization
- Removable transparent hinged doors and slide-away covers shall allow for easy access during install and visibility of interior after install
- Panel shall employ patch cord bend radius guides to minimize macro bending
- Stackable and adjustable fiber rings simplify cable management
- Panel shall be 2 or 4 rack units in height and shall hold up to 6 or 12 adapter plates, respectively
- Panel shall be Made in the United States
- ALL FIBER SHALL BE FUSION SPLICED
- COLOR: black with translucent blue cover panels
- Quantity: See Drawing for quantity and installation details.
- Part#: Leviton Opt-X SDX 2000i no exceptions

2U - 5R2UH-S06 4U - 5R4UH-S12

2.4 Premise Splice Enclosures – Portable Classroom Distribution

- Modular wall-mount enclosures used to directly splice outside plant or intra- building cables
- Four fusion/mechanical splice trays; 4" Standard Splice Tray, 4" x 11.75" x 0.25" # T4LHS-P06
- Constructed of cold-rolled steel
- ALL FIBER SHALL BE FUSION SPLICED
- CPS-24, Customer Premise Splice Enclosure, empty (2 tray capacity)
- Part#: CPS24-STD

2.5 Fiber Optic Adapter Plates

- The Fiber adapter plate shall precision molded and compatible with all approved panels and enclosures (rack- or wall-mount).
- The adapter plate shall be offered in LC style in 12 or 24 fiber configurations per plate.
- The adapter plate shall be compliant to TIA-568-C.3 (for performance) and respective TIA-604-X (for intermateability) standards.
- Adapter plates shall use zirconia ceramic sleeves and be offered in standard fiber type colors pursuant to TIA-568-C.3 standards.
- The adapter and plate shall be integrated using precision-molded injection manufacturing methods, to eliminate "rattle" and loose fit.
- Adapter plates shall be made in the United States of America.
- Meets TIA-604-10B (LC) for connector intermateability
- ALL FIBER SHALL BE FUSION SPLICED
- COLOR: Aqua for Multimode, Blue for Singlemode, Black for blank plates
- Part #:

6-port Duplex LC MM Adapter Panel, 5F100-2QL 6-port Duplex LC SM Adapter Panel, 5F100-2LL Blank Adapter Panel, 5F100-PLT

2.6 Fiber Optic OSP Splice Enclosures

- Used to directly splice outside plant or intra-building cables.
- Accommodates various splice tray designs, Maximum Capacity: 96 single fibers using 5" x 7" and 4" x 7" trays
- Enclosure mode from 16-gauge steel, Hinges shall be Stainless steel
- Two-year limited product warranty.
- Durable powder-coat finish COLOR: Beige
- ☐ Size 16" x 15" x 3.4"
- ALL FIBER SHALL BE FUSION SPLICED
- Part #: Leviton CPS Customer Premise Splice Enclosure, Single Door,
 24 Fiber Trays # CPS24-STD

Injection Molded Mini Splice Tray, Heat Shrink style (accepts standard sleeves), up to 12 fiber splicing # T5PLS-12F

Splice Tray Mounting Hardware Kit # SPLMT-HKT

Splice Sleeve, 40 mm # FSSSD-040

Cable clamp kit # CPCSR-001 & CPCSR-002

Grounding kit # CPGRD-KIT

Key Locking kit # CPLOK-KIT

3. Copper Termination Panels

- 3.1 OSP Protection Panels (Intercom Backbone Headend)
- 16 AWG Powder Coated Steel Construction
- Equipped with an Internal 26 AWG Fuse Link
- External Ground Connectors Accept 6 14 AWG Wire
- Industry Standard 5 Pin Design
- Exceeds UL497 Primary Protection Standards
- Stackable with Connection Grommets Included
- 66 Block Accepts 22 26 AWG Wire/18 19 AWG Stripped Solid Copper Wire
- Color: NA
- Quantity: See Drawing for quantity and installation details.

Part#: Circa Enterprise inc.

25 pair block, PN# 1890ECT1-25

50 pair block, PN# 1890ECT1-50

100 pair block, PN# 1890ECT1-100

3.2 OSP Protection Fuses

- 240VDC (RUS Approved)
- Nanosecond response time
- External failsafe mechanism that permanently carbon arrestors grounds the module under sustained high current conditions
- Integrated Test Points
- UL & cUL listed
- Designed to meet or exceed Telcordia standards
- ISO 9002 Certified Manufacturer
- Color: RED
- Quantity: See Drawing for quantity and installation details.

Part#: Circa Enterprise inc. 4B1SF-240

*Provide 100% fuse density for all installed Protection Panels.

3.3 Voice Termination Block (Intercom Backbone building/TC and Intercom Devices)

- Pair Capacity 50
- Blocks shall be wall mounted.
- Terminates 22 26 AWG (0.81 0.41mm) solid insulated cable or 18 19 AWG (1.02 0.91mm) solid stripped cable
- Blocks shall have stand-off legs included for all locations; S89 series stand- off bracket
- Made from High impact flame retardant thermoplastic
- ☐ Height: 254mm (10 in.), width: 86.4mm (3.4 in.), depth: 30.5mm (1.2 in.)
- Part#:

Leviton 66-Style Termination block, 40066-M50 Leviton 66-Style Mounting bracket, 40089-00D

D. Cabinets, Racks, and Enclosures

Contractor will provide the following 'HC' Enclosures and components based on the number of cables to that will be terminated:

1. Cabinets:

- Wall-mounted cabinets shall be manufactured from steel sheet.
- Each cabinet will have a rear panel that attaches to the wall, a hinged cabinet body that swings open from the rear panel providing easy access to the rear of equipment and a locking front door.
- The rear panel will provide cable access with pre-punched knockouts, up to 3", for conduit along the top and bottom edges of the panel. There will also be cutouts in the back of the rear panel so that cables can enter the panel through the wall. The rear panel will provide attachment points for accessory equipment mounting brackets and cable tie points within the panel (cabinet).
- The cabinet body will include a single pair of vertical 19" EIA equipment mounting rails. The mounting rails will be EIA-310-D compliant with the Universal hole pattern. Mounting holes will have #12-24 threads.
- Mounting rails will be adjustable in depth so that they can be positioned at any point within the cabinet body. The design of all cabinets will allow an additional pair of mounting rails (for a total of two pairs of mounting rails per cabinet) to be added to the cabinet.
- The wall-mount cabinet shall provide a hinge design that attaches the cabinet body and the rear panel and allow the rear panel to be removed during installation. The hinge design will allow the cabinet body to open at least 90°. The hasp used to secure the rear panel and the cabinet body together will assist in drawing the components together during the locking action
- The cabinet body will include vents that are designed to accept fan kits.
- The front door will be hinged and locking. The front door and rear panel will be keyed alike. The front door will have rounded edges and corners. The cabinet body will allow the front door to be attached so that it will swing open from the right or left. The cabinet manufacture shall provide an option for a solid or a tinted plexi-glass window front door. The plexiglass in doors shall be bronze acrylic (not clear) with a UL flammability classification of 94HB or better.
- Finish shall be epoxy-polyester hybrid powder coat (paint).
- The cabinet shall have the option of being delivered fully assembled. All cabinets will include installation hardware (hex lag screws) for wood study and 50 each #12-24 equipment mounting screws.
- Load bearing capacity for cabinets that wall-mount will be a minimum of 200 pounds per cabinet.
- Cabinets that are wall-mount only will be certified and UL Listed to standard UL 60950 under category NWIN.
- CONTRACTOR TO INSTALL PROFESSIONALY SO OWNER PROVIDED EQUIPMENT FITS IN THE RACK. VERIFY RAILS ARE PROPERLY ALIGNED SO ALL EQUIPMENT FITS (including UPS, Network equipment, cables, cords, power strip, etc.) AND DOORS CLOSE. VERIFY SPACING BETWEEN PANELS IS ADEQUATE FOR EQUIPMENT INSTALLATION. VERIFY WITH OWNER CABINET LAYOUT FOR PATCH PANELS, ETC BEFORE INSTALLATION.
- Color: Wall Mount Cabinet will be BLACK
- Quantity: See Drawing for size, quantity and installation details.

• Part#:

Wall Mount Cabinet

18U Cabinet equal to Chatsworth Products, PN# 11900-736 26U Cabinet equal to Chatsworth Products, PN# 11900-748

*Contractor will provide an additional set of mounting rails for each wall mount cabinet, equal to Chatsworth Products PN# 12787-5xx.

Wall/Floor Mount Cabinet

33U Cabinet equal to Chatsworth Products, PN# 13495-760 40U Cabinet equal to Chatsworth Products, PN# 13495-772

*Contractor will provide an additional set of mounting rails for each wall mount cabinet, equal to Chatsworth Products PN# 13276-7xx.

Fan Kit/Filter Kit

Equal to Chatsworth Products Fan Kit, PN# 12804-701 Equal to Chatsworth Products Filter Kit, PN# 12805-701

Grounding Kit

Equal to Chatsworth Products, PN# 10610-019 Power Strip with Surge Suppression Leviton 5500-192

2. Floor Mount 2-post Racks

- Each rack shall have two L-shaped top angles, two L-shaped base angles and two C-shaped equipment-mounting channels. The rack shall assemble with nut and bolt hardware. The base angles shall be prepunched for attachment to the floor.
- Equipment mounting channels shall be 3" (76 mm) deep and punched on the front and rear flange with the EIA-310-D Universal hole pattern, 1-3/4" (44.45 mm) rack-mount spaces (U), to provide 45U, 52U or 58U for equipment. Each mounting space (U) shall be marked and numbered on the mounting channel.
- When assembled with top and bottom angles, equipment-mounting channels shall be spaced to allow attachment of 19" EIA rack-mount equipment. Equipment attachment points shall be threaded with 12-24 roll-formed threads. The rack shall include assembly and equipment-mounting hardware. Racks shall include 50 each combination pan head, pilot point mounting screws.
- The assembled rack shall measure 7' (2.1 m)/84" (2133 mm) high, 8' (2.4 m)/96" (2438 mm) high or 9' (2.7 m)/108" (2743 mm) high; 20.3" (515.9 mm) wide and 15" (381.0 mm) deep. The sides (webs) of the equipment-mounting channels shall be punched to allow attachment of vertical cable managers along the sides of the rack or for rack-to-rack baying.
- Assembly hardware shall electrically bond the top angles, side channels and base angles together when assembled, and there shall be a masked ground attachment point with 1/4-20 threaded studs spaced 5/8" apart on the inside of the side channel to attach a ground lug allowing easy attachment to the Telecommunications Ground.
- The rack shall be rated for 1,000 lb (453.6 kg) of equipment.
- Certifications: Communications Circuit Accessory, DUXR and DUXR7 category, file number 140851

- Material: Steel and aluminum extrusion
- Construction: Bolted assembly, Ships unassembled
- VERIFY RACK LAYOUT WITH OWNER PRIOR TO INSTALLATION.
- Color: BLACK
- Quantity: See Drawing for quantity and installation details.
- Part#: Chatsworth Products Inc.

Floor Mount 2-Post

Rack CPI# 55053-703

Vertical Wire Managers

Equal to Leviton, PN# 8980L-VFR

Power Strip with Surge Suppression

Leviton 5500-192

3. Floor Mount 4-post Racks

- Four-post frame with threaded mounting holes used to support 19" wide rack- mount communications equipment and shelves
- For indoor use only, in environmentally controlled areas; may not be used
- outdoors, in industrial or harsh environments, or in plenum spaces
- Includes: (1) top pan, (1) bottom pan, (4) mounting channels, (2) base angles, (2) top angles
- Assembly hardware; (100) #12-24 equipment mounting screws
- Equipment Support: Front and rear pairs of 3" deep C-shaped equipment mounting channels, Fixed in place, 29" apart front-to-rear, 19" wide, EIA-310- D compliant hole pattern
- 1-3/4" high rack-mount units (RMU); RMU spaces are marked and numbered on the channels
- Universal hole pattern, 5/8"-5/8"-1/2" vertical hole spacing
- Threaded #12-24 equipment mounting holes, Includes 100 each #12-24 equipment mounting screws
- Load capacity: 2000 lb of equipment
- Material:; Aluminum extrusion, Aluminum sheet
- Construction: Bolted assembly, Ships unassembled
- VERIFY WITH OWNER RACK LAYOUT PRIOR TO INSTALLATION.
- Color: BLACK
- Quantity: See Drawing for quantity and installation details.
- Part#: Chatsworth Products Inc.

Floor Mount 4-Post Open Frame

Rack CPI# 15053-703

Grounding

Kit 10610-

019

Power Strip with Surge Suppression

Leviton 5500-192

4. Floor Mount Cabinets

- Four-post frame with threaded mounting holes used to support 19" wide rack- mount communications equipment and shelves
- For indoor use only, in environmentally controlled areas; may not be used
- outdoors, in industrial or harsh environments, or in plenum spaces
- Includes: (1) top pan, (1) bottom pan, (4) mounting channels, (2) base angles, (2) top angles
- Assembly hardware; (100) #12-24 equipment mounting screws

- Equipment Support: Front and rear pairs of 3" deep C-shaped equipment mounting channels, Fixed in place, 29" apart front-to-rear, 19" wide, EIA-310- D compliant hole pattern
- 1-3/4" high rack-mount units (RMU); RMU spaces are marked and numbered on the channels
- Universal hole pattern, 5/8"-5/8"-1/2" vertical hole spacing
- Threaded #12-24 equipment mounting holes, Includes 100 each #12-24 equipment mounting screws
- Load capacity: 2000 lb of equipment
- Material:; Aluminum extrusion, Aluminum sheet
- Construction: Bolted assembly, Ships unassembled
- VERIFY WITH OWNER CABINET LAYOUT PRIOR TO INSTALLATION.
- Color: BLACK
- Quantity: See Drawing for quantity and installation details.
- Part#: Chatsworth Products Inc.

Floor Mount Cabinet

CPI# M1050-741

Grounding

Kit 10610-

019

Power Strip with Surge Suppression

Leviton 5500-192

- 5. Outdoor Wireless Access Point Enclosure
 - Non-glass-filled polyester material, UV resistance; Overlapping tongue-and-groove raised cover and gasket provide secure Type 4X seal
 - Removable snap-hinge cover allows for easy access to cover and body for modifications
 - Molded layout grid on inside of body and solid covers assists with component mounting
 - Molded-in embosses for rear panel mounting
 - Internal rail system and adjustable panel blocks allow
 - UL 508A Listed, NEMA/EEMAC Type 4
 - Material: Non-glass-filled polyester
 - Color: Light-Gray
 - Quantity: See Drawing for quantity and installation details.
 - Part#: Pentair
 - Polypro Wifi, PN# D16148WF

E. Cable Support System

- 1. Ladder Rack Cable Runway
 - Stringers shall be fabricated from 16ga .375" x 1.5" Cold Rolled Steel tubing.
 - Rungs shall be fabricated from 16ga .5" x 1.0" Cold Rolled Steel tubing
 - Rungs shall be spaced at 9.0" center to center
 - 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.
 - Ladder Rack shall have a powder coat finished.
 - Ladder Rack shall be available in standard 6ft. and 10ft. lengths.
 - Ladder rack shall be a part of a total system that includes: manufacture bends, wall supports, joining hardware, etc.

- Ladder Rack shall be grounding per the TIA/EIA 607-A.
- Color: Ladder Rack will be BLACK
- Quantity: See Drawing for quantity and installation details.
- Part#: Equal to Chatsworth Products Cable Raceway, PN# 11252-71X

PART 3 – BACKBONE SLACK LOOPS

- Storage rings may be used to store coiled slack loops on backboard.
- Part #:

Fiber storage rings, Indoor fiber: 48900-IFR Fiber storage rings, Outdoor fiber: 48900-OFR

PART 4 – EXECUTION

4.1 Installation

A. Work Area Outlets Installation

- No more than 12" of cable shall be stored in an outlet box, modular furniture raceway, or insulated walls.
- Bend radius of the cable in the termination area shall not be less than 4 times the outside diameter of the cable.
- The cable jacket shall be maintained to within 12.7mm (½ inch) of the termination point.
- All UTP cables shall have no more than 6.4mm (1/4 inch) of pair *untwisted* at the termination point.
- 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).
- 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.
- 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.
- All faceplates installed shall be level.
- All outlets will be labeled according to the approved labeling scheme.
- 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.
- Cables shall be identified by a self-adhesive label in accordance with the Identification and Labeling section of this specification and ANSI/TIA/EIA-606. 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

Cable shall be installed in accordance with manufacturer's recommendations

- and best industry practices.
- Nylon or plastic locking cable ties, e.g. "Zip-Ties", shall not be used on this project.
- Contractor will provide at least 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.
- Tie Wraps will not be allowed for supporting, bundling and/or dressing of any station cables on this project.
- Contractor will provide at least 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.
- 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.
- Cable raceways shall not be filled greater than the Owner's 40% fill ratio. Contact Owner as needed to understand the Owner's fill ratio requirement.
- Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.
- The cable's minimum bend radius and maximum pulling tension shall not be exceeded.
- Pulling tension on 4-pair UTP cables shall not exceed 25-lb for a four-pair UTP cable.
- The Cable Support System shall be installed in such a way that will allow for future cables to be added and to provide sufficient protection of all cable.
- 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:
 - J-hooks shall be installed to support all station cables every 14" 28" inches.
 - All pathways shall be run at right angles. No diagonal pathways will be allowed unless otherwise noted on the drawings.
 - 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 64 cables per Caddy's CAT64 J-hook.
 - A separate J-hook is used for each group of cable. Specifically, CAT6 cable, fiber cable, and fire alarm are to have their own J-hook.
 - At no point shall cable(s) rest on acoustic ceiling grids, acoustic panels, or lighting fixtures.
 - All cables will be installed so that there is a minimum of 3" of clearance above all ceiling grid and tiles.
 - All cables will be installed so that there is a minimum of 12" of clearance above all florescent lighting.
 - All cables will be installed so that there is a minimum of 6" of clearance from all fire alarm and electrical system conduits.
 - 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.
- 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.
- 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.
- Contractor is responsible for sealing around all cables that penetrate fire rated barriers.
- Wireless and overhead cables shall be secured by an in-ceiling mounting bracket affixed to its dedicated ceiling wire or mounted to building structure.
- 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

- Cables shall be cleaned, dressed, and terminated in accordance with the recommendations made in the TIA/EIA-568-A standard, manufacturer's recommendations and best industry practices. Contractor to verify standard network equipment can be installed without any interference from the cables. Equipment typically is installed directly above and/or below the panel.
- The cable jacket shall be maintained to within 12.7mm (½ inch) of the termination point.
- All UTP cables shall have no more than 6.4mm 1/4 inch) of pair *untwist* at the termination point.
- Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.
- All cables shall be neatly bundled in groups of 24 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.
- 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

- Backbone cables shall be installed separately from horizontal distribution cables.
- Each individual cable is to be labeled. See details sheets for labeling examples. Cable type, installation date, and from/to are required. Each cable to be labeled at any accessible point, including, but not limited to, pull boxes, Christy boxes, junction boxes, and any pass through location.
- Where possible the backbone and horizontal cables shall be installed in

- separate conduits.
- Where possible backbone cables of the same type shall be combined in conduit runs to maximize conduit fill ratios.
- 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.
- Pulling tension on Backbone cables shall not exceed the manufacture's limitations.
- The minimum bend radius for all Backbone cables is 16 times the cable diameter or the manufactures specification, whichever is greater.
- Cable slack shall be provided in every pull box, junction box, cabinet, entry facility, telecom room and termination enclosure.
 - * 25 feet of slack per cable shall be mounted on a service ring inside the enclosure.
 - * All cable shall be installed such that all cable is above the bottom of the enclosure. All cable shall be suspended on cable support hooks around the perimeter of the enclosure. Cable Support Hooks equal to Hubbell Power Systems PN# C2031124 and C2031133 (part numbers dependent on size of enclosure, sample part numbers only, not to be used in all circumstances).
 - * Entry & telecom rooms & cabinets: Minimum 25' feet coiled in recloseable storage ring.
 - * If 25' is not possible, contact the owner and discuss an agreeable amount of slack, followed up with an confirming RFI.
 - * Minimum of 25' of slack in each vault and a minimum of 15' of slack in any other type of box (pull box, Christy box, pass through space, etc).
- 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.
- A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.
- All backbone cables shall be securely fastened to the sidewall of the TR on each floor.
- 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.
- 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.
- 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

- Cables shall be cleaned, dressed, and terminated in accordance with the recommendations made in the TIA/EIA-568-C document, manufacturer's recommendations and best industry practices.
- Bend radius of the cable in the termination area shall not exceed 16 times the outside diameter of the cable.
- All cables shall be neatly bundled and dressed continuously from the entrance point of the Telecommunications Room to their respective panels or blocks.

- 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.
- Wall mounted termination block fields shall be installed with the lowest edge of the mounting frame 18" from the finished floor.
- 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

- Wall Mount Racks/Cabinets shall be securely attached to the Telco Backboard using minimum 5/16" hardware or as required by local codes. Mounting rails shall be adjusted to the proper depth to allow for the closing of doors when populated with network electronics. Coordinate with Owner for final depth required.
- 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.
- All Floor Mount Racks/Cabinets will be either; secured on one side to the wall or attached to the closest wall with ladder rack.
- All Racks/Cabinets shall be braced to meet Zone 4 seismic requirements.
- Contractor will maintain a minimum of 36 inches of clearance from the front of the all rack/cabinets and all other obstructions.
- Floor Mount Racks/Cabinets shall be installed to allow for a minimum of 36" from rear and all other obstructions.
- All racks shall be grounded to the telecommunications ground bus bar.
- 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.
- The plywood bottom edge shall be mounted vertically no less than 12" above the finished floor.
- Contractor will provide all cutouts for the Electrical Contractors expansion rings and electric receptacles as shown on the drawings.
- Ladder Rack must be securely attached to walls, backboards, and racks/cabinets to comply with all Zone 4 seismic requirements.
- Ladder rack shall be installed so that there is a minimum of 8" of unobstructed clearance above rack.
- 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.

4.2 Identification and Labeling

A. The labeling scheme for CAT6 cable is as follows for classrooms (verify with Owner prior to printing the labels):

When entering the room (if the room has multiple doors, the door designated as the primary entry door), label numbering shall start a one (1) and then increment as data drops are added going around the room, then any drops in the ceiling, and then any drops in the floor. For each room, numbering starts over at one (1). Each jack color starts at

one (1) and increments for each additional jack of the same color. Label designations are based on jack color:

Blue = $D#$	White $=$ V#	Yellow = W#	Gray = A#	Purple = $C#$
Patch Panel La	abel Format: RM	[# -		

The first part of the label shall be the room number the data drop is located in, RM is part of the label, followed by the room number or room designation. The last part of the label shall be the type, as stated above based on jack color, then followed by the drop number. For example, RM3-D10 is room 3, data drop 10. RM3-V2 would be room 3, voice data drop 2.

The label format in the room: RM# - -

The first part of the label shall be RM, followed by the room number/ designation the cabinet/rack is located in.

The second part of the label shall be the patch panel the cable is terminated on. The top most panel is A and continues down with B, C, etc... If multiple panels span more than one rack/cabinet, when standing in front of the rack/cabinets, the top left panel shall be A.

The last part of the label uses the label based on jack color, as stated above, and the drop number. Example, RM3-A-D10: Indicates the other end of the cable is in the cabinet/rack in room 3, terminated on panel A, and the last portion, ie D10 in this example, was the tenth data drop in this room. The last portion, D10 in this example, would match the patch panel label, RM3-D10.

Label scheme for non-classroom buildings follows the above scheme, but the label number starts at 1 (one) for each type (D, V, W, A, C) and increments throughout the building and does not reset for each room/office. Start at one and do not repeat the number anywhere in the building (for each type).

- 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.
- E. All fiber cable labels are to include the type, count, from and to on each label. Any

point the fiber is accessible shall be labeled. At a minimum, that would include the starting point, any Christy boxes, cabinets/racks, any rooms the cable passes through, and the ending point. Service loops provided and labeled at each location, a minimum of 25' in each vault and 15' minimum in a Christy box/any other box or pass through space.

- F. Labels are to be verified by Owner prior to printing. Labels are to include building/room designations used by the site. Do NOT use building/room designations from the plans unless approved by Owner in writing.
- G. Fiber optic cable lables are to verified by Owner prior to printing and include:

CABLE TYPE FROM TO DATE INSTALLED

For example: Single Mode – 36 Count MDF IDF in Room XX INSTALLED: JULY 2017

4.3 Testing and Acceptance

A. General

- 1. The Owner reserves the right to be present during any & all types of tests being performed.
- 2. Contractor will notify the Owner/Owner's Representative 24 hours before commencement of testing.
- 3. 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.
- 4. Contractors shall provide proof of test equipment calibration prior to testing.
- 5. Test equipment shall have been factory calibrated within six months of project testing dates.
- 6. 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 TIA/EIA-568-C, 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.
- 7. 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.
- 8. Test results are required to be sent to Owner in PDF format and in FLW format.

IF there are an unusual amount of cables that passed marginal, as indicated by the tester, Contractor to re-terminate all cables and re-test.

B. Copper Cable Testing

1. Twisted Pair Cable

- All twisted-pair copper cable links (including backbone cables) shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below.
- 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.
- Cables that are passed by the tester but marked as marginally passed, typically indicated by an asterisk (*), may be required to be re-terminated and re-tested by Owner if there are an unusually high percentage of cables that were marginally passed by the tester. Unusually high is determined by Owner
- 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

- Follow the Standards requirements established in:
 - ANSI/TIA/EIA-568-C.0 Wire Map Length Attenuation NEXT (Near end crosstalk)
 - ANSI/TIA/EIA-568-C.2 Return Loss
 ELFEXT Loss Propagation Delay Delay skew
 PSNEXT (Power sum near-end crosstalk loss) PSELFEXT (Power sum equal level far-end crosstalk loss)
- 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 or better than Fluke Network's Versiv DSX CableAnalyzer.
- All testers shall have been recalibrated within 6 months of use on this project. Contractor will be asked to provide proof of recalibration.
- 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. A PDF of the test results and the Fluke FLW File are required to be sent to Owner for review.

3. Category 6A Performance

• Shall met all test parameters as stated above for Category 6, with the addition of PSANEXT, PSAACR, and PSAACR-F:

C. Fiber Optic Cable Testing

1. Backbone Fiber

- Each fiber strand shall be tested for attenuation with an Optical Power Meter and light source and with an Optical Time Domain Reflectometer (OTDR) for actual length and splice/connector loss. Cable length shall be verified using sheath markings. The guidelines and procedures established for Tier 1 testing in TIA/TSB-140 shall apply.
- All fiber optic cables shall be tested from the site's MDF to each fiber terminals located in the IDF. The results of OTDR testing to define the length of each riser cable shall be documented. The Contractor shall conduct a power meter (loss) test of each fiber optic station and riser cable at both wavelengths, 850/1300nm for MM and 1310/1550nm for SM, A to B, B to A, and OSPL (OSPL is defined as La + Lb). No individual station or riser fiber link segment (including connectors) shall measure more than 2.0 dB loss. Tests shall be conducted using ANSI/EIA/TIA/EIA-526-14A, Method B. Test results evaluation for the panel to panel (backbone) shall be based on the values set forth in ANSI/TIA/EIA-568-C.2.The Contractor shall provide an electronic printout for each strand tested with the Power Meter and the OTDR.
- Where concatenated links are installed to complete a circuit between devices, the Contractor shall test each link from end to end to ensure the performance of the system. After the link performance test has been successfully completed, each link shall be concatenated and tested. The test method shall be the same used for the test described above. The evaluation criteria shall be established between the Owner and the Contractor prior to the start of the test.
- All installed cables must meet or exceed the defined standards for performance. The Contractor shall take all steps necessary to repair or replace any optic not meeting the standard.
- Fiber optic riser and station cable test results shall be provided in electronic format to the Owner. PDF and Fluke FLV files are to be sent to Owner.

4.4 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 USB 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, a 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. 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 IDF that includes the building layout for that IDF, along with the outlet locations and all of the approved labeling. The as-built/current layout is to be provided.
- I. Test results are to be submitted to the manufacturer and a copy of the warranty certification is to be provided to the owner.

END OF SECTION

(THIS PAGE LEFT INTENTIONALLY BLANK)

SECTION 283100 - FIRE DETECTION AND ALARM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Section 21 00 00 Fire Suppression.
- B. Section 26 00 00 Electrical
- C. Section 27 10 00 Structured Cabling System

1.2 REFERENCES

- A. Electrical Industries Association (EIA):
 - 1. EIA-232-D Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange
 - 2. TIA-485-A Electrical Characteristics of Generators and Receivers for Use in Balanced Multipoint Systems

B. California Code of Regulations

1. Title 24, Part 3 – California Electrical Code (CEC)

C. National Fire Protection Association (NFPA):

- 1. NFPA 12 Standard on Carbon Dioxide Extinguishing Systems.
- 2. NFPA 13 Installation of Sprinkler Systems.
- 3. NFPA 15 Standard for Water Spray Fixed Systems for Fire Protection.
- 4. NFPA 16 Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems.
- 5. NFPA 16A Standard for the Installation of Closed Head Foam-Water Sprinkler Systems.
- 6. NFPA 72 National Fire Alarm Code.
- 7. NFPA 90A Standard for the Installation of Air Conditioning and Ventilating Systems.
- 8. NFPA 101 Life Safety Code.
- 9. NFPA 750 Standard on Water Mist Fire Protection Systems.
- 10. NFPA 5000 Building Construction and Safety Code.

D. Underwriters Laboratories (UL):

- 1. UL 268 Standard for Smoke Detectors for Fire Alarm Signaling Systems.
- 2. UL 864 Standard for Control Units and Accessories for Fire Alarm Systems.
- 3. UL 1971 Standard for Signaling Devices for the Hearing Impaired.

1.3 SCOPE OF WORK

- A. Furnish all labor, equipment, and materials for, and comply with the performance requirements of the Fire Alarm System indicated in the drawings and specified herein.
- B. It is the intent of the Contract Documents to provide an installation complete in every respect. In the event that additional details or special construction is required to accomplish work indicated or specified in this or other sections, it shall be the responsibility of the Contractor to provide all

materials and equipment which is usually furnished with such systems in order to complete the installation, whether or not specifically mentioned herein.

1.4 SYSTEM DESCRIPTION

A. A new, intelligent reporting, Style 7 networked, fully peer-to-peer, microprocessor-controlled fire detection and notification system shall be installed in accordance with the specifications and as indicated on the Drawings.

B. Basic Performance:

- 1. Network Communications Circuit Serving Network Nodes: Connected using approved fiber optic cable between nodes in Class A configuration (NFPA Style 7).
- 2. Signaling Line Circuits (SLC) Serving Addressable Devices: Wired Class B.
- 3. Initiation Device Circuits (IDC) Serving Non-addressable Devices Connected to Addressable Monitor Modules: Wired Class B.
- 4. Notification Appliance Circuits (NAC) Serving Strobes and Horns: Wired Class B.
- 5. Alarm Signals Arriving at Control Panel: Not lost following primary power failure until alarm signal is processed and recorded.
- 6. Network Node Communications:
 - a. Communicated between panels on Style 7 connected fiber optic cables.
 - b. To enhance system survivability, ability to operate on loss of Command Center, short or open of entire riser at Command Center shall be demonstrated at time of system acceptance testing.
 - c. Systems that are not capable of providing true Style 7 riser performance shall not be acceptable.
- 7. Signaling Line Circuits (SLC):
 - a. SLC modules shall operate in peer-to-peer fashion with all other panels in system.
 - b. On loss of Command Center, each remaining panel shall continue to communicate with remainder of system, including all SLC and control functions Systems that provide a "Degraded" mode of operation upon loss of Command Center or short in riser shall not be acceptable.
 - c. Limit the number of devices to 80% of the maximum allowed of each type on SLC circuits.
- 8. Notification Appliance Circuits (NAC):
 - a. Arranged such that loss of any 1 NAC circuit will not cause loss of any other NAC circuit in system.
 - b. Electrically supervised for open and short circuit conditions.
 - c. If short circuit exists on NAC circuit, it shall not be possible to activate that circuit.
 - d. Voltage drop is not to exceed 10% at the furthest point on any NAC circuit.
- 9. Emergency Voice/Alarm Communications (EVAC):
 - a. Arranged such that loss of any 1 EVAC amplifier or branch will not cause loss of any other EVAC circuit in the system.

- b. Electrically supervised for open and short circuit conditions.
- c. If short circuit exists on NAC circuit, it shall not be possible to activate that circuit.
- d. Voltage drop is not to exceed 10% at the furthest point on any NAC circuit.

10. Standby Power:

a. Provide a minimum of 20% spare battery capacity above calculated requirements.

C. Sequence of Operations:

- 1. General Alarm: Upon alarm activation of any area smoke detector, duct smoke detector, heat detector, manual pull station, or sprinkler water flow switch, the following functions shall automatically occur:
 - a. The internal audible device shall sound at the control panel or command center.
 - b. The LCD Display shall indicate all applicable information associated with the alarm condition including zone, device type, device location and time/date.
 - c. All system activity/events shall be documented on the system printer.
 - d. Any remote or local annunciator LCD/LED's associated with the alarm zone shall be illuminated.
 - e. The following notification signals and actions shall occur simultaneously:
 - i. A signal shall be sounded on fire floors (zones). The signal shall be a Temporal 3 tone.
 - ii. Activate visual strobes on the fire floors (zones). The visual strobe shall stop operating when the "Alarm Silence" is pressed.
 - iii. Transmit signal to the building automation system (if applicable) and/or shutdown all HVAC units serving the floor of alarm.
 - iv. Transmit signal to the central station with point identification.
 - V. Activate automatic smoke control sequences (if applicable).
 - vi. All stairwell/exit doors shall unlock throughout the building.
 - vii. All self-closing fire/smoke doors held open shall be released.
 - viii. All automatic events programmed to the alarm point shall be executed and the associated outputs activated.
- 2. Elevator Lobby / Equipment Room Detectors: Upon alarm activation of any elevator lobby smoke detector or equipment room detector the following functions shall automatically occur:
 - a. Perform general alarm sequence above.
 - b. Elevator Lobby smoke detectors shall recall the elevators to primary floor
 - c. Elevator Lobby smoke detectors located on the primary recall floor shall recall the elevator the alternate floor.
 - d. Equipment room smoke detectors shall recall the elevator to the primary floor.
 - e. Activation of the Equipment room heat detector shall initiate the shunt trip in the associated elevator equipment room.
- 3. Supervisory Operation: Upon supervisory activation of any sprinkler valve supervisory switch, fire pump off-normal, clean agent fire suppression system trouble, the following functions shall automatically occur:
 - a. The internal audible device shall sound at the control panel or command center.
 - b. The LCD display shall indicate all applicable information associated with the supervisory condition including; zone, device type, device location and time/date.
 - c. All system activity/events shall be documented on the system printer.

- d. Any remote or local annunciator LCD/LED's associated with the supervisory zone shall be illuminated.
- e. Transmit signal to the central station with point identification.
- 4. Trouble Operation: Upon activation of a trouble condition or signal from any device on the system, the following functions shall automatically occur:
 - a. The internal audible device shall sound at the control panel or command center.
 - b. The LCD keypad display shall indicate all applicable information associated with the trouble condition including; zone, device type, device location and time/date.
 - c. All system activity/events shall be documented on the system printer.
 - d. Any remote or local annunciator LCD/LED's associated with the trouble zone shall be illuminated.
 - e. Transmit signal to the central station with point identification.
- 5. Monitor Operation: Upon activation of any device connected to a monitor circuit (fire pump/emergency generator status), the following functions shall automatically occur:
 - a. The LCD display shall indicate all applicable information associated with the status condition including; zone, device type, device location and time/date.
 - b. All system activity/events shall be documented on the system printer.
 - c. Any remote or local annunciator LCD/LED's associated with the status zone shall be illuminated.

D. Fire Alarm System Functionality:

- 1. Provide complete, electrically supervised distributed, networked analog/addressable fire alarm and control system, with analog initiating devices.
- 2. Fire Alarm System:
 - a. Incorporate E3 Series multiprocessor-based control panels, with Intelligent Loop Interface (ILI-MB-E3), and RPT-E3 repeater modules communicating over peer-to-peer token ring network with capacity of up to 64 nodes.
- 3. Each ILI-MB-E3 Node: Incorporate 2 Signaling Line Circuits (SLC), with capacity to support up to 159 analog addressable detectors and 159 addressable modules per SLC.
- 4. All data transmits over single pair of wires or fiber optic cable.
- 5. Each Network Node: Incorporate Boolean control-by-event programming, including as a minimum AND, OR, NOT, and Timer functions.
- 6. Control Panels: Capability to accept firmware upgrades via connection with laptop computer, without requirement of replacing microchips.
- 7. Network:
 - a. Based on peer-to-peer token ring technology operating at 625 K baud, using Style 7 configuration.
 - b. Capability of using twisted-pair wiring, pair of fiber optic cable strands up to 200 microns, or both, to maximize flexibility in system configuration.

8. Each Network Node:

- a. Capability of being programmed off-line using Windows-based software utilized by fire alarm system manufacturer. Capability of being downloaded by connecting laptop computer into any other node in system. Systems that require system software to be downloaded to each transponder at each transponder location shall not be acceptable.
- b. Capability of being grouped with any number of additional nodes to produce a "Region", allowing that group of nodes to act as 1, while retaining peer-to-peer functionality. Systems utilizing "Master/Slave" configurations shall not be acceptable.
- c. Capability of annunciating all events within its "Region" or annunciating all events from entire network, on front panel LCD without additional equipment.
- 9. Each SLC Network Node: Capability of having integral DACT (digital alarm communicator transmitter) that can report events in either its region, or entire network to single central station monitoring account.
- 10. Each Control Panel: Capability of storing its entire program, and allow installer to activate only devices that are installed during construction, without further downloading of system.
- 11. Password Protection: Each system shall be provided with 4 levels of password protection with up to 16 passwords.

1.5 SUBMITTALS

- A. Comply with Section 01 33 00 Submittal Procedures.
- B. Include sufficient information, clearly presented, to determine compliance with the specifications and the Drawings. Insufficiently detailed submittals shall be rejected.
- C. Equipment Submittals:
 - 1. Cover Page: Indicate the following:
 - a. Project name and address.
 - b. Engineered systems distributor's name and other contact information.
 - c. Installing contractor's name and other contact information.
 - d. Date of equipment submittals. Indicate on revised submittals the original submittal date and revised submittal date.
 - 2. Table of Contents: Lists each section of equipment submittal.
 - 3. Scope of Work Narrative: Detail indented scope of work.
 - 4. Sequence of Operations: Use matrix or written text format, detailing activation of each type of device and associated resulting activation of the following:
 - a. Control panel.
 - b. Annunciator panels.
 - c. Notification appliances.
 - d. Building fire safety functions, including elevator recall, elevator power shutdown, door lock release, door holder release, HVAC unit shutdown, smoke evacuation system activation, and stair pressurization fan activation.

- 5. Bill of Material: Indicate for each component of system the following:
 - a. Quantity.
 - b. Model number.
 - c. Description.
- 6. SLC Circuit Schedule: Detail address and associated description of each addressable device. Clearly provide information that indicates number of both active and spare addresses.
- 7. Battery Calculations: Show load of each of, and total of, components of system along with standby and alarm times that calculations are based on. Show calculated spare capacity and size of intended battery.

D. Shop Drawings:

- 1. Cover Page: Indicate the following:
 - a. Project name and address.
 - b. Engineered systems distributor's name and other contact information.
 - c. Installing contractor's name and other contact information.
 - d. Date of equipment submittals. Indicate on revised submittals the original submittal date and revised submittal date.

2. Floor Plans:

- a. Provide separate floor plan for each floor.
- b. If a floor plan must be split using match lines to fit on the page, provide match lines and match line references that refer to sheet number that shows area on opposite side of match line.
- c. Prepare using CAD program capable of producing AutoCAD compliant DXF (Drawings Exchange Format) files.
- d. Prepare to scale no smaller than 1/8 inch = 1'-0", unless otherwise required by the Architect or Engineer.
- e. Show equipment and device locations.
- f. Show wiring information in point-to-point format.
- g. Show conduit routing, if required by the AHJ.
- 3. Title Block: Provide on each sheet and include, at a minimum, the following:
 - a. Project name.
 - b. Project address.
 - c. Sheet name.
 - d. Sheet number.
 - e. Scale of drawing.
 - f. Date of drawing.
 - g. Revision dates, if applicable.
- 4. Control Panel: Provide sheet that details exterior and interior views of control panel and clearly shows associated wiring information.
- 5. Annunciator Panels: Provide sheet that details exterior and interior views of annunciator panels and clearly shows associated wiring information.

E. Certification: Submit with equipment submittals and shop drawings, letter of certification from major equipment manufacturer, indicating proposed engineered system distributor is an authorized representative of major equipment manufacturer.

F. Project Record Drawings:

- 1. Submit complete project record drawings within 14 calendar days after acceptance test.
- 2. Project record drawings shall be similar to shop drawings, but revised to reflect changes made during construction.

G. Operation and Maintenance Manuals:

- 1. Submit complete operation and maintenance manuals within 14 calendar days after acceptance test.
- 2. Operation and maintenance manuals shall be similar to equipment submittals, but revised to reflect changes made during construction.
- 3. Include factory's standard installation and operating instructions.

1.6 APPROVAL

- A. All Fire Alarm System components are required to be listed with the California State Fire Marshal (CSFM).
- B. Installation of the Fire Alarm System shall not commence until all approvals are granted by the California State Fire Marshal (CSFM), Division of the State Architect (DSA), and any other Authorities Having Jurisdiction (AHJ).
- C. Installation of the system shall not commence until all shop drawings and submittals are approved by the School District, Architect of Record, and Engineer of Record.

1.7 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. NFPA: System shall comply with all applicable NFPA codes and standards:
 - 2. ADA: System shall conform to American with Disabilities Act (ADA).
- B. To ensure reliability and complete compatibility, all items of fire alarm system, including control panels, power supplies, initiating devices, and notification appliances, shall be listed by Underwriters Laboratories Inc. (UL) and shall bear the "UL" label.
- C. Fire Alarm Control Panel Equipment: UL-listed under UL 864 Ninth Edition.
- D. Equipment, Programming, and Installation Supervision:
 - 1. The contractor is required to hold a C-10 license and any other certifications required by the Authority Having Jurisdiction.
 - 2. The contractor is required to be an approved engineered systems distributor of Gamewell-FCI for equipment, programming, and installation supervision.
 - 3. Proof of factory training shall be delivered within 14 calendar days of award of the Contract.

E. Software Modifications:

1. Provide services of Gamewell-FCI factory-trained and authorized technician to perform system software modifications, upgrades, or changes.

- 2. Provide use of all hardware, software, programming tools, and documentation necessary to modify fire alarm system software on-site.
- 3. Modification includes addition and deletion of devices, circuits, zones, and changes to system operation and custom label changes for devices or zones.
- 4. System structure and software shall place no limit on type or extent of software modifications on-site.
- 5. Modification of software shall not require power-down of system or loss of system fire protection while modifications are being made.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
- C. Handling: Protect materials from damage during handling and installation.

1.9 COORDINATION

A. Coordinate the Work of this section with the Work of other sections, including sprinkler systems, elevators, HVAC systems, and security/door locking systems, as applicable.

1.10 WARRANTY

- A. Warranty Period for System Equipment: 1 year from date of final acceptance.
- B. Trouble Calls: The contractor shall guarantee on-site service for the Fire Alarm System within 24 hours of the receipt of a trouble call.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Gamewell-FCI, Honeywell Fire Systems

12 Clintonville Road, Northford, Connecticut 06472. Phone (203) 484-7161. Fax (203) 484-7118. Website: www.gamewell-fci.com

- 1. NO SUBSTITUTION.
- B. System Sensor

3825 Ohio Avenue, St. Charles, Illinois 60174.

Phone (630) 377-6580. Fax (630) 377-6495. Website: www.systemsensor.com

2.2 DISTRIBUTED NETWORKED FIRE ALARM SYSTEM

A. Distributed Networked Fire Alarm System: Gamewell-FCI E3 Series Expandable Emergency Evacuation Fire Alarm System.

2.3 CONTROL PANEL HARDWARE

- A. Intelligent Control Panel: Supply user interface, including LCD or touch-screen 1/4 VGA display Intelligent Loop Interface Modules (ILI-MB-E3), manual switching, Control Panel shall consist of the following units and components:
 - 1. System Cabinet (B-, C-, or D-Size Cabinet) with associated inner door.
 - 2. Power Supply Module (PM-9) with batteries.
 - 3. 80-Character LCD Display (LCD-E3).
 - 4. Intelligent Loop Main Board Interface (ILI-MB-E3).
 - 5. Intelligent Loop Supplemental Interface (ILI-S-E3).
 - 6. FocalPoint Gateway (FPT-GATE-E3).
 - 7. Optional DACT (DACT-E3).
 - 8. Optional Network Repeater (RPT-E3).
 - 9. Optional 1/4 VGA touch-screen display (NGA).
 - 10. Optional Auxiliary Switch Module (ASM-16).

B. System Cabinet:

- 1. Surface or semi-flush mounted with texture finish.
- 2. Consist of back box, inner door, and door.
- 3. Available in at least 3 sizes to best fit project configuration.
- 4. Houses 1 or more PM-9 Power Supply Modules, 1 or more ILI-MB-E3 or ILI-S-E3 assemblies, and other optional modules as specified.
- 5. Construction: Dead-front steel construction with inner door to conceal internal circuitry and wiring.
- 6. Wiring: Terminated on removable terminal blocks to allow field servicing of modules without disrupting system wiring.
- C. Power Supply Module (PM-9): Use latest technologies to provide power to the Control Panel and incorporate the following features:
 - 1. Power-saving switching technology using no step-down transformers.
 - 2. 9-amp continuous-rated output to supply up to all power necessary under normal and emergency conditions.
 - 3. Integral battery charger with capacity to charge up to 55 amp-hour batteries while under full load.

D. Batteries:

1. Sufficient capacity to provide power for entire system upon loss of normal AC power for a period of 24 hours with 15 minutes of alarm signaling at end of this 24-hour period, as required by NFPA 72, Local Systems.

E. LCD Display Module (LCD-E3):

- 1. LCD Display: 80-character RS-485 based textual annunciator with capability of being mounted locally or remotely. Provides audible and visual annunciation of all alarms and trouble signals. Provide dedicated LEDs for:
 - a. AC Power On: Green.
 - b. Alarm: Red.
 - c. Supervisory: Yellow.
 - d. System Trouble: Yellow.
 - e. Power Fault: Yellow.
 - f. Ground Fault: Yellow.

- g. System Silenced: Yellow.
- 2. 80-Character Alphanumeric Display: Provide status of all analog/addressable sensors, monitor and control modules. Display shall be liquid crystal type (LCD), clearly visible in dark and under all light conditions.
- 3. Panel shall contain 4 functional keys:
 - a. Alarm Acknowledge.
 - b. Trouble Acknowledge.
 - c. Signal Silence.
 - d. System Reset/Lamp Test.
- 4. Panel shall contain 3 configuration buttons:
 - a. Menu/Back.
 - b. Back Space/Edit.
 - c. OK/Enter.
- 5. Panel shall have 12-key telephone-style keypad to permit selection of functions.
- F. Intelligent Loop Interface (ILI-MB-E3): System shall be of multiprocessor design to allow maximum flexibility of capabilities and operation. Intelligent Loop Interface shall be capable of mounting in stand-alone enclosure as specified.
 - 1. Field Programmable: System shall be capable of being programmed by Field Configuration Program (FCP), allowing programming to be downloaded via portable computer from any node on network.
 - 2. RS-232C Serial Output: Supervised RS-232C serial port shall be provided to operate remote printers and/or video terminals, accept downloaded program from portable computer, or provide 80-column readout of all alarms, troubles, location descriptions, time, and date. Communication shall be standard ASCII code operating from 1,200 to 115,200 baud rate.
 - 3. RS-485 Serial Output: Each ILI-MB-E3 shall incorporate RS-485 bus via ribbon harness for connection of modules inside same cabinet, and via 4-wire quick connector for connection of modules up to 3,000 feet from cabinet. Each ILI-MB-E3's RS-485 bus shall support up to 16 ASM-16 auxiliary switch modules, 6 LCD-E3 main annunciators, and 5 LCD-7100 annunciators.
 - 4. Peer-to-Peer Panel Configuration: All Loop Interface Modules shall incorporate own programming, log functions, Central Processor Unit, and control-by-event (CBE) programming. If any loop driver becomes disabled, each remaining loop driver shall continue to communicate with remainder of network and maintain normal operation.
 - 5. Control-by-Event (CBE) Program: ILI-MB-E3 shall be capable of programming using Boolean logic including AND, OR, NOT, and TIMING functions to provide complete programming flexibility.
 - 6. Alarm Verification: Smoke detector alarm verification shall be standard option while allowing other devices such as manual stations and sprinkler flow to create immediate alarm. This feature shall be selectable for smoke sensors that are installed in environments prone to nuisance or unwanted alarms.
 - 7. Alarm Signals: All alarm signals shall be automatically latched or "locked in" at control panel until operated device is returned to normal and control panel is manually reset. When used for sprinkler flow, "SIGNAL SILENCE" switch may be bypassed, if required by AHJ.
 - 8. Electrically Supervised:
 - a. Each SLC and NAC circuit shall be electrically supervised for opens, shorts, and ground faults. Occurrence of fault shall activate system trouble circuitry, but shall not interfere with proper operation of other circuits.
 - b. Yellow "SYSTEM TROUBLE" LEDs shall light and system audible sounder shall steadily sound when trouble is detected in system. Failure of power, open or short

circuits on SLC or NAC circuits, disarrangement in system wiring, failure of microprocessor or any identification module, or system ground faults shall activate this trouble circuit. Trouble signal shall be acknowledged by operating "TROUBLE ACKNOWLEDGE" switch. This shall silence sounder. If subsequent trouble conditions occur, trouble circuitry shall resound. During alarm, all trouble signals shall be suppressed with exception of lighting yellow "SYSTEM TROUBLE" LEDs.

- 9. Drift Compensation Analog Smoke Sensors: System software shall automatically adjust each analog smoke sensor approximately once each week for changes in sensitivity due to effects of component aging or environment, including dust. Each sensor shall maintain its actual sensitivity under adverse conditions to respond to alarm conditions while ignoring factors which generally contribute to nuisance alarms. System trouble circuitry shall activate, display units that requires maintenance.
- 10. Analog Smoke Sensor Test: System software shall automatically test each analog smoke sensor a minimum of 3 times daily. Test shall be recognized functional test of each photocell (analog photoelectric sensors) and ionization chamber (analog ionization sensors) as required annually by NFPA 72. Failure of sensor shall activate system trouble circuitry, display "Test Failed" indication, and identify individual device that failed.
- 11. Off-Premises Connection:
 - a. Fire Alarm System: Connect via Digital Alarm Communicator Transmitter (DACT) and telephone lines to central station or remote station. Panel shall contain disconnect switch to allow testing of system without notifying fire department.
- 12. Central Station Option: Fire alarm control panel shall provide Digital Alarm Communicator Transmitter (DACT) for signaling to central station. DACT shall contain "Dialer-Runaway" feature preventing unnecessary transmissions as result of intermittent faults in system and shall be Carrier Access Code (CAC) compliant, accepting up to 20-digit central station telephone numbers. Fire department shall be consulted as to authorized central station companies serving municipality. Fire alarm system shall transmit both alarm and trouble signals, with alarm having priority over trouble signal. Contractor shall be responsible for all installation charges and Owner will be responsible for line lease charges.
- 13. Network Annunciator Option: Each ILI-MB-E3 and associated display shall provide option of being configured as network annunciator. Options for annunciation shall default as regional annunciator with capability of selecting global annunciation to provide system-wide protection and Acknowledge, Silence, and Reset capabilities.
- 14. Redundant History Log: Each ILI-MB-E3 shall contain full 4100 event history log supporting local and network functions. If a main processor or network node is lost the entire log shall be accessible at any other Loop Interface board. This shall be demonstrated by removing power from Command Center followed by extraction of history log from any loop driver location, including Command Center or Transponder.
- 15. LEDs Indicator and Outputs: Each ILI-MB-E3 Loop Interface shall incorporate as a minimum the following diagnostic LED indicators:
 - a. Power: Green.
 - b. Alarm: Red.
 - c. Supervisory: Yellow.
 - d. General Trouble: Yellow.
 - e. Ground Fault: Yellow.
 - f. Transmit: Green.
 - g. Receive: Green.
- 16. Auxiliary Power Outputs: Each ILI-MB-E3 Loop Interface shall provide the following supply outputs:
 - a. 24 VDC non-resettable, 1 amp. maximum, power limited.

- b. 24 VDC resettable, 1 amp. maximum, power limited.
- 17. Microprocessor: Loop interface shall incorporate 32-bit RISC processor. Isolated "watchdog" circuit shall monitor microprocessor and upon failure shall activate system trouble circuits on display. Microprocessor shall access system program for all control-by-event (CBE) functions. System program shall not be lost upon failure of both primary and secondary power. Programming shall support Boolean logic including AND, OR, NOT, TIME DELAY functions for maximum flexibility.
- 18. Auto Programming: System shall provide for all SLC devices on any SLC loop to be preprogrammed into system. Upon activation of auto programming, only devices that are present shall activate. This allows for system to be commissioned in phases without need of additional downloads.
- 19. Environmental Drift Compensation: System shall provide for setting Environmental Drift Compensation by device. When detector accumulates dust in chamber and reaches unacceptable level but yet still below allowed limit, control panel shall indicate maintenance alert warning. When detector accumulates dust in chamber above allowed limit, control panel shall indicate maintenance urgent warning.
- 20. NON-FIRE Alarm Module Reporting: Non-reporting type ID shall be available for use for energy management or other non-fire situations. NON-FIRE point operation shall not affect control panel operation nor shall it display message at panel LDC. Activation of NON-FIRE point shall activate control by event logic, but shall not cause indication on control panel.
- 21. 1-Man Walk Test:
 - a. System shall provide both basic and advanced walk test for testing entire fire alarm system. Basic walk test shall allow single operator to run audible tests on panel. All logic equation automation shall be suspended during test and while annunciators can be enabled for test, all shall default to disabled state. During advanced walk test, field-supplied output point programming shall react to input stimuli, such as CBE and logic equations. When points are activated in advanced test mode, each initiating event shall latch input. Advanced test shall be audible and shall be used for pull station verification, magnet activated tests on input devices, input and output device, and wiring operation/verification.
 - b. Test feature is intended to provide for certain random spot testing of system and is not intended to comply with requirements of testing fire alarm systems in accordance with NFPA 72, as it is impossible to test all functions and verify items such as annunciation with only 1 person.
- 22. Signaling Line Circuits: Each ILI-MB-E3 module shall provide communication with analog/addressable (initiation/control) devices via 2 signaling line circuits. Each signaling line circuit shall be capable of being wired Class B, Style 4 or Class A, Style 6. Circuits shall be capable of operating in NFPA Style 7 configuration when equipped with isolator modules between each module type device and isolator sensor bases. Each circuit shall communicate with a maximum of 159 analog sensors and 159 addressable monitor/control devices. Unique 40-character identifier shall be available for each device. Devices shall be of the Velocity series with capability to poll 10 devices at a time with a maximum polling time of 2 seconds when both SLCs are fully loaded.
- 23. Notification Appliance Circuits: 2 independent NAC circuits shall be provided on ILI-MB, polarized and rated at 2 amperes DC per circuit, individually over current protected and supervised for opens, grounds, and short circuits. They shall be capable of being wired Class B, Style Y or Class A, Style Z.
- 24. Alarm Dry Contacts: Provide alarm dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system alarm occurs.

- 25. Supervisory Dry Contacts: Provide supervisory dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system supervisory condition occurs.
- 26. Trouble Dry Contacts: Provide trouble dry contacts (Form C) rated 2 amps at 30 VDC (resistive) and transfer whenever system trouble occurs.

H. Auxiliary Switch Module (ASM-16):

- 1. Each ASM-16 has 16 programmable push-button switches.
- 2. Each push-button switch has 3 associated status LEDs (red, yellow, and green), configurable to indicate any combination of functions.
- 3. Flexible switch configurations to allow auxiliary functions.
- 4. An insertable label to identify function of each switch and LEDs combination.
- 5. Provide capability to communicate with up to 16 ASM-16 modules locally, or up to 3,000 feet from the Control Panel

I. Network Repeater Module RPT-E3:

- 1. Intelligent Network Interface shall provide interconnection and protection of remote Control Panels. Repeater shall regenerate and condition token passing, 625 K baud signal between units. Repeater shall be available in wire, fiber, or wire/fiber configurations as determined by field conditions.
- 2. Fiber configurations shall use "ST"-type connectors and be able to operate with up to 200-micron multi-mode fiber, but optimize for 62.5/125. Interface shall have jumper to allow selection of ground detection of wiring when used in wire mode. Interface shall have integral LEDs to display current status of board.
- J. Network Graphic Annunciator (NGA): Networked, 1/4 VGA, touch-screen annunciator with the following characteristics:
 - 1. Custom Graphics: Panel shall permit uploading of custom bit-mapped graphic to display screen. Graphic shall display when all systems are normal.
 - 2. Intuitive Functions: In alarm or trouble condition, annunciator shall display only information pertaining to event, including control switches.
 - a. Trouble Condition: Display shall indicate cause of trouble. Only controls available to operator shall be Acknowledge and Reset functions.
 - b. Alarm Condition: Display shall indicate cause of alarm. Only controls available to operator shall be Acknowledge, Silence, and Reset functions.

2.4 SUPPLEMENTAL NOTIFICATION APPLIANCE CIRCUIT (HPF24)

- A. Supplemental Notification Appliance Circuit (HPF24) shall be either Model HPF24S6 or HPF24S8, as indicated on drawings, offering up to 6.0 amps (4.0 amps continuous) or 8.0 amps (6.0 amps continuous), respectively, of regulated 24-volt power. HPF24 shall include the following features:
 - 1. Integral Charger: Charge up to 18.0 amp-hour batteries and support 60-hour standby.
 - 2. 2 Input Triggers. Input trigger shall be Notification Appliance Circuit (from fire alarm control panel) or relay.
 - 3. Surface-mount back box.
 - 4. Ability to delay AC fail delay in accordance with applicable NFPA requirements.
 - 5. Power limited circuitry in accordance with applicable UL standards.
 - 6. Operates as sync follower or a sync generator

2.5 SYSTEM PERIPHERALS

A. Addressable Devices – General:

- 1. Provide address-setting means using rotary-decimal switches.
- 2. Use simple to install and maintain decade-type (numbered 0 to 15) address switches by using standard screwdriver to rotate 2 dials on device to set address. Devices which use binary address set via dipswitch packages, handheld device programmer, or other special tools for setting device address shall not be acceptable.
- 3. Detectors: Analog and addressable. Connect to fire alarm control panel's Signaling Line Circuits.
- 4. Addressable Thermal and Smoke Detectors: Provide 2 status LEDs. Both LEDs shall flash under normal conditions, indicating detector is operational and in regular communication with control panel, and both LEDs shall be placed into steady illumination by control panel, indicating alarm condition has been detected. If required, flashing mode operation of detector LEDs can be programmed off via fire control panel program.
- 5. Fire Alarm Control Panel: Permit detector sensitivity adjustment through field programming of system. Sensitivity can be automatically adjusted by panel on time-of-day basis.
- 6. Using software, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. Detectors shall be listed by UL as meeting calibrated sensitivity test requirements of NFPA 72, Chapter 7.
- 7. Detectors shall be ceiling-mounted and shall include separate twist-lock base with tamper-proof feature.
- 8. Following bases and auxiliary functions shall be available:
 - a. Standard base with remote LED output.
 - b. Sounder base rated at 85 dBA minimum.
 - c. Form-C relay base rated 30 VDC, 2.0 A.
 - d. Isolator base.
- 9. Detectors shall provide test means whereby they will simulate alarm condition and report that condition to control panel. Such test shall be initiated at detector itself by activating magnetic switch or initiated remotely on command from control panel.
- 10. Detectors shall store internal identifying type code that control panel shall use to identify type of device (PHOTO, THERMAL).

B. Addressable Manual Stations (MS-7AF):

- 1. Manual Fire Alarm Stations: Non-code, non-break glass type, equipped with key lock so they may be tested without operating handle.
- 2. Operated Station: Visually apparent, as operated, at a minimum distance of 100 feet (30.5 m) from front or side.
- 3. Stations shall be designed so after actual activation, they cannot be restored to normal except by key reset.
- 4. Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on cover. The word FIRE shall appear on front of stations in raised letters, 1.75 inches (44 mm) or larger.
- 5. Addressable manual stations shall, on command from control panel, send data to panel representing state of manual switch and addressable communication module status.
- C. Intelligent Thermal Detectors (ATD-L2F, ATD-HL2F): Intelligent addressable devices rated at 135 degrees F (58 degrees C) and 190 degrees F (73 degrees C), respectively. Connect via 2 wires to fire alarm control panel signaling line circuit.

D. Intelligent Photoelectric Smoke Detectors (ASD-PL2F): Use photoelectric (light-scattering) principal to measure smoke density and shall, on command from control panel, send data to panel representing analog level of smoke density.

E. Intelligent Duct Smoke Detectors (ADPF):

- 1. In-Duct Smoke Detector Housing: Use on-board intelligent photoelectric detector, which provides continuous analog monitoring and alarm verification from panel.
- 2. When sufficient smoke is sensed, alarm signal is initiated, and appropriate action taken to shut down or change over air handling systems to help prevent rapid distribution of toxic smoke and fire gases throughout areas served by duct system.
- 3. Duct Smoke Detectors Mounted Above Ceiling or Otherwise Obstructed from Normal View: Provide with remote alarm indicator.
- 4. Each Detector: Install in either supply side or return side duct in accordance with local mechanical code.

F. Addressable Dry Contact Monitor Modules (AMM-2F):

- 1. Provide to connect 1 supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel SLCs.
- 2. Mount in standard deep electrical box.
- 3. IDC Zone: Suitable for Style B operation.

G. Addressable Dry Contact Monitor Modules (AMM-4F):

- 1. Provide to connect 1 supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel SLCs.
- 2. Mount in 4-inch (102-mm) square, 2-1/8-inch (54-mm) deep electrical box.
- 3. IDC Zone: Suitable for Style D or Style B operation.
- 4. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

H. Addressable Dry Contact Monitor Modules (AMM-2IF):

- 1. Provide to connect 2 supervised IDC zones of conventional alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel SLCs.
- 2. Mount in 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box.
- 3. IDC Zones: Suitable for Style B operation.
- 4. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

I. Addressable Dry Contact Monitor Modules (MMI-10F):

- 1. Provide to connect 10 supervised Style B IDC zones or 5 supervised Style D IDC zones of conventional alarm initiating devices (any N.O. dry contact device) to 1 of the fire alarm control panel SLCs.
- 2. Mount in factory-supplied MBB-2 or MBB-6 enclosure.
- 3. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

J. 2-Wire Detector Monitor Modules (AMM-4SF):

- 1. Provided to connect 1 supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).
- 2. Mount in 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to optional surface-mounted back box.
- 3. IDC Zone: Wired for Class A or B (Style D or Style B) operation.

4. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

K. 2-Wire Detector Monitor Modules (MMI-6SF):

- 1. Provided to connect 6 supervised Class B IDC zones of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).
- 2. Mount in factory-supplied MBB-2 or MBB-6 enclosure.
- 3. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

L. Addressable Control Modules (AOM-2SF):

- 1. Provide to supervise and control operation of 1 conventional NAC of compatible, 24-VDC powered, polarized audio/visual notification appliances or UL-listed polarized relays for fan shutdown and other auxiliary control functions.
- 2. Mount in standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to surface-mounted back box.
- 3. Control Module NAC: Wire for Style Z or Style Y (Class A/B) with up to 1 amp of inductive signal or 2 amps of resistive signal operation. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.
- 4. Audio/Visual Power: Provide by separate supervised power circuit from main fire alarm control panel or from supervised, UL-listed remote power supply.

M. Addressable Control Modules (MMO-6SF):

- 1. Provide to supervise and control operation of 1 conventional NAC of compatible, 24-VDC powered, polarized audio/visual notification appliances or UL-listed polarized relays for fan shutdown and other auxiliary control functions.
- 2. Mount in factory-supplied MBB-2 or MBB-6 enclosure.
- 3. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.
- 4. Control module NAC: Wire for Style Z or Style Y (Class A/B) with up to 1 amp of inductive signal or 2 amps of resistive signal operation. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.
- 5. Audio/Visual Power: Provide by separate supervised power circuit from main fire alarm control panel or from supervised, UL-listed remote power supply.

N. Addressable Relay Modules (AOM-2RF):

- 1. Available for HVAC control and other building functions. Relay shall have 2 Form C sets of contacts that operate in tandem and are rated for a minimum of 2.0 amps resistive or 1.0 amps inductive. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.
- 2. Mount in standard 4-inch (101.6-mm) square, 2-1/8-inch (54-mm) deep electrical box or to surface-mounted back box.

O. Addressable Relay Modules (MMO-6RF):

1. Available for HVAC control and other building functions. Relay shall be Form C and rated for a minimum of 2.0 amps resistive or 1.0 amps inductive. Relay coil shall be magnetically latched to reduce wiring connection requirements and to ensure 100 percent of all auxiliary relay or NACs shall be energized at same time on same pair of wires.

- 2. Mount in factory-supplied MBB-2 or MBB-6 enclosure.
- 3. LEDs: Flash under normal conditions, indicating monitor module is operational and in regular communication with control panel.

P. Isolator Modules (M500X):

- 1. Provide to automatically isolate wire-to-wire short circuits on SLC Class A or Class B branch. Isolator module shall limit number of modules or detectors that may be rendered inoperative by short-circuit fault on SLC loop segment or branch. At least 1 isolator module shall be provided for each floor or protected zone of building. No more than 25 devices shall be connected to 1 isolator module.
- 2. If wire-to-wire short occurs, isolator module shall automatically open-circuit (disconnect) SLC. When short-circuit condition is corrected, isolator module shall automatically reconnect isolated section.
- 3. Does not require address-setting, and its operations shall be totally automatic. Not necessary to replace or reset isolator module after normal operation.
- 4. Mount in standard 4-inch (101.6-mm) deep electrical box or in surface-mounted back box.
- 5. Single LED: Flash to indicate isolator is operational and illuminate steadily to indicate short-circuit condition has been detected and isolated.

Q. Addressable Projected Beam Detectors (ABD-2F):

- 1. Single-ended, reflective design.
- 2. Six user-selectable sensitivity levels.
- 3. Operates in range from 16 feet to 328 feet.
- 4. Temperature Range of Device: Minus 22 degrees F to 131 degrees F.
- 5. Beam Detector: Automatic gain control to compensate for gradual signal deterioration from dirt accumulation on lenses.
- 6. UL LIsted.
- 7. Ability to be tested using calibrated test filters or magnet-activated remote test station.

R. Sprinkler Waterflow Switches (provided and installed by the sprinkler contractor):

- 1. Integral, mechanical, non-coded, non-accumulative retard type.
- 2. Alarm transmission delay time conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30 to 45 seconds.
- 3. Single manufacturer and series.
- 4. Where possible, locate waterflow switches a minimum of 1 foot from fitting which changes direction of flow and a minimum of 3 feet from valve.
- 5. Waterflow switches shall be provided and connected under this section but installed by the mechanical contractor.

S. Sprinkler and Standpipe Valve Supervisory Switches (provided and installed by the sprinkler contractor):

- 1. Each sprinkler system water supply control valve riser, zone control valve, and standpipe system riser control valve shall be equipped with supervisory switch. Standpipe hose valves, test valves, and drain valves shall not be equipped with supervisory switches.
- 2. PIV (Post Indicator Valve) or Main Gate Valves: Equip with supervisory switch.
- 3. Mount not to interfere with normal operation of valve and adjust to operate within 2 revolutions toward closed position of valve control, or when stem has moved no more than one-fifth of distance from normal position.
- 4. Contain in weatherproof aluminum housing, which shall provide 3/4-inch (19-mm) conduit entrance and incorporate necessary facilities for attachment to valves.
- 5. Switch Housing Finish: Red baked enamel.

- 6. Entire Installed Assembly: Tamper proof and arranged to cause switch operation if housing cover is removed or if unit is removed from mounting.
- 7. Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.

T. Graphic Annunciator (Uses ANU-48 Serial Driver Board):

- 1. Communicate to fire alarm control panel via EIA-485 (multi-drop) 2-wire communications loop. Up to 16 annunciator drivers, each configured up to 48 points, shall be connected per ILI-MB-E3.
- 3. ANU-48: Provide interface to approved UL-listed graphic-style annunciator and provide each of the features specified.

U. Remote LCD Display Annunciator:

- 1. Furnish and install as indicated on the Drawings a remote serial annunciator, Model LCD-7100. Annunciator shall provide 80-character display, which shall duplicate all information on basic system display, including any network nodes its host panel is annunciating, with exception of menus. Contain the following function keys:
 - a. Alarm Acknowledge.
 - b. Trouble Acknowledge.
 - c. Signal Silence.
 - d. System Reset/Lamp Test.
 - e. System Drill Test.
- 2. Key Lock: Enable switches only when placed in "ON" position, with exception of Trouble Acknowledge, which is used to silence local trouble audible sounder. Annunciator shall contain the following LEDs:
 - a. Alarm.
 - b. Supervisory.
 - c. System Trouble.
 - d. Power Fault.
 - e. System Silenced.
- 3. Mount on standard 3-gang surface or flush electrical box.
- 4. Each ILI-MB-E3: Accommodate up to 5 remote LCD-7100 annunciators which shall be located up to 3,000 feet from control panel.

V. Notification Appliances: Wheelock Exceeder Series, ET1010 Series

- 1. Operate on 24 VDC
- 2. Interior speakers shall have selectable output options of 1/8, 1/4, 1/2, 1, and 2 watts continuous power.
- 3. Exterior speakers shall have additional selectable outputs of 4 and 8 watts.
- 4. Strobe Maximum Pulse Duration: 0.2 second.
- 5. Strobe Intensity: UL 1971.
- 6. Flash Rate: UL 1971.
- 7. Strobe Candela Rating: Determine by positioning selector switch on back of device.

2.6 WIRING

A. Raceways:

- 1. EMT: Allied Tube & Conduit "Fire Alarm Red" steel EMT conduit, or equivalent.
- 2. Other raceways, junction boxes, etc.: Where fire alarm raceway is not buried underground, it shall be painted red.

B. Cables & Conductors:

- 1. Optical Fiber Network Cable: 6-Strand Cable, as per data specification.
- 2. Signaling Line Circuit Cable:
 - a. OSP: West Penn #AQ225 (Black Jacket)
 - b. ISP: West Penn #D980 (Red Jacket)
- 3. Notification Appliance Circuit Cable:
 - a. OSP: West Penn #AQ227 (Black Jacket)
 - b. ISP: West Penn #974 (Red Jacket)
- 4. Voice Evacuation Speaker Cable:

As per notification appliance manufacturer.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine areas and surfaces to receive fire alarm system.
 - 1. Notify Architect of conditions that would adversely affect installation or subsequent use.
 - 2. Do not begin installation until unacceptable conditions are corrected.

3.2 INSTALLATION

- A. Install fire alarm system in accordance with NFPA 72, CEC, state and local codes, manufacturer's instructions, and as indicated on the Drawings.
- B. Smoke detectors shall neither be installed within 36 inches of any HVAC supply or return air grille, to include air handling light fixtures, nor within 12 inches of any wall.
- C. Smoke detectors shall not be installed before system programming and test period. If construction is ongoing during this period, take measures to protect smoke detectors from contamination and physical damage.
- D. Wall mounted notification appliances shall be installed not lower than 80 inches and not higher than 96 inches, above finished floor. Devices shall be not be mounted within 6 inches of the ceiling.
- E. All fire alarm devices shall be accessible for periodic maintenance. Should a device location indicated in the Contract Documents not meet this requirement, it shall be the responsibility of the Contractor to bring it, in writing, to the attention of the Engineer.
- F. Flush-mount fire detection and alarm system devices, control panels, and remote annunciators in finished areas. Flush-mount or surface-mount fire detection and alarm system devices, control panels, and remote annunciators in unfinished areas.
- G. Ensure manual stations are suitable for surface mounting or semi-flush mounting as indicated on the Drawings. Install stations at 48 inches above finished floor, measured to operating handle.
- H. End of Line Resistors shall be furnished as required by the manufacturer. Devices containing endof-line resistors shall be appropriately labeled so as not to require removal to identify the EOL device.

I. Addressable modules shall be mounted within 36 inches of the monitored or controlled point of termination. This shall include, but is not necessarily limited to, fan shutdown, elevator recall, shunt trip, sprinkler status points, or door release. Label all addressable modules as "FIRE ALARM SYSTEM" and to their function, e.g., "FAN F-1 SHUTDOWN".

J. Conduit/Raceways, Junction Boxes:

- 1. All systems and system components listed to UL864 Control Units for Fire Protective Signaling Systems maybe installed within a common conduit raceway system, in accordance with the manufacture's recommendations. System(s) or system components not listed to the UL864 standard shall utilize a separate conduit raceway system for each of the sub-systems.
- 2. The fire alarm system cabling / wiring shall be installed in RED color conduit, minimum size 3/4". In upgrade projects, existing fire alarm system conduit may be reused, if serviceable. Paint existing conduits red to match new.
- 2. All junction box covers shall be painted red.
- 2. Minimum conduit size shall be 3/4" trade size.
- 3. Conceal conduit, junction boxes, and conduit supports and hangers in finished areas. Conceal or expose conduit, junction boxes, and conduit supports and hangers in unfinished areas. Concealed installation is preferred wherever possible.

K. Cables & Conductors:

- 1. Cables & conductors shall be labeled at both ends as to their origin and destination; e.g. "FACP i1-1" indicates the origin as the FACP and the destination as initiation device "i1-1". Utilize Panduit labels (or equivalent), size MP-150c through MP-350, as required by the amount of information on the label.
- 2. Splices in wiring are permitted only at terminal cabinets, or locations specifically approved by the Engineer. Do not splice in conduit, pull boxes, inaccessible locations, etc.

L. Terminal Cabinets:

- 1. Wiring shall be neatly bundled, fanned, tagged, and laced. Leave minimum three inches fan space between terminal block connection and vertical wiring. Incoming wiring shall terminate on the left, outgoing on the right.
- 2. Wire terminations at devices and terminal strips shall be "spade" type terminal connections, Sta-Kon, or equivalent.
- 3. Terminal barrier strips shall be Cinch 142 series (or equivalent) with minimum six points. Leave minimum two space separation between types of system cables. Provide minimum four spare termination points.
- M. Coordinate the required space in the Data equipment frames with this and other network based systems. Provide racks with sufficient space to accommodate all systems.

3.3 SYSTEM UPGRADES

A. When upgrading an existing system, the existing fire alarm shall be tested in the presence of an assigned representative of Central Unified School District prior to any work being started by a contractor. Upon completion of testing, it shall be the contractor's responsibility to note any discrepancy with the existing system. It will be contractor's responsibility to provide and complete a working system, minus any discrepancies noted.

- B. When upgrading an existing system, all end of line resistors shall be changed out to meet the manufacturer's specifications for each fire panel. Install the latest software updates on existing equipment to be reused.
- C. When specifications call for the removal of existing equipment, that equipment shall be returned to the District.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide service of competent, factory-trained technician authorized by manufacturer to technically supervise and participate during pre-testing and acceptance testing of system.

B. Testing:

- 1. Conduct complete visual inspection of control panel connections and test wiring for short circuits, ground faults, continuity, and insulation before energizing cables and wires.
- 2. Close each sprinkler system control valve and verify proper supervisory alarm at Control Panel
- 3. Verify activation of flow switches.
- 4. Open initiating device circuits and verify that trouble signal actuates.
- 5. Open signaling line circuits and verify that trouble signal actuates.
- 6. Open and short notification appliance circuits and verify that trouble signal actuates.
- 7. Ground initiating device circuits and verify response of trouble signals.
- 8. Ground signaling line circuits and verify response of trouble signals.
- 9. Ground notification appliance circuits and verify response of trouble signals.
- 10. Check installation, supervision, and operation of intelligent smoke detectors.
- 11. Introduce on system each of the alarm conditions that system is required to detect. Verify proper receipt and proper processing of signal at Control Panel and correct activation of control points.
- 12. Consult manufacturer's manual to determine proper testing procedures when system is equipped with optional features. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality, and similar.

C. Acceptance Testing:

- 1. The contractor's job foreman and an assistant, in the presence of a representative of the manufacturer, an assigned representative of Central Unified School District, and the assigned inspector of the AHJ, shall perform a test of the system. All attending personnel shall be given reasonable notice so as to make themselves available for the test.
- 2. Operate every installed device to verify proper operation and correct annunciation at the control panel.
- 2. Open signaling line circuits and notification appliance circuits in at least 2 locations to verify presence of supervision.
- 3. Completely disconnect main Control Panel from rest of network. Activate initiating device. All control outputs supported by transponder SLC circuits shall operate under project programming mode. Default or degrade mode programming shall not be acceptable.
- 4. Complete any additional testing required by the AHJ.
- 5. When testing has been completed to satisfaction of both Contractor's job foreman, representatives of the manufacturer and Owner, and the inspector of the AHJ, a notarized

- letter co-signed by each attesting to satisfactory completion of said testing shall be forwarded to the Owner and fire department.
- 6. Leave fire alarm system in proper working order and, without additional expense to Owner, replace defective materials and equipment provided within 1 year (365 days) from date of final acceptance by the owner.

3.5 DEMONSTRATION

- A. Provide instruction as required for operating fire alarm system.
- B. Provide hands-on demonstrations of operation of fire alarm system components and functions.

END OF SECTION

SECTION 312000 - EARTHWORK: EXCAVATION, FILLING AND GRADING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Excavating soil and other material for surface improvements.
 - 2. Placing fill.
 - 3. Compaction of existing ground and fill.
 - 4. Preparation of subgrade for other improvements.
 - 5. Grading of soil.

B. RELATED SECTIONS

- 1. Contract General Conditions and Division 1, General Requirements
- 2. Section 31 22 22 Soil Materials

1.3 REFERENCES

A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18-inch (457 mm) Drop.

1.4 DEFINITIONS

A. Utility: Any buried or above ground pipe, conduit, cable, associate device or appurtenances, or substructure pertaining thereto.

1.5 SUBMITTALS

A. Product Data:

1. Information indicating the source of all import material, the fill material type and where it is to be used, and approval of the District's Inspector of Record for incorporation of import material into the Work.

B. Material Test Reports:

- 1. Classification of Soils.
- 2. Compaction Characteristics of Soils.
- 3. Density and Unit Weight of Soils in Place.
- 4. Imported fill shall be tested and approved by the Owner's Geotechnical Engineer prior to import to the site, including testing for compliance with Department of Toxic Substances Control (DTSC) guidelines. Said testing and certification documents shall be paid for by the Owner.
- C. Project Closeout: In accordance with Specification Section PROJECT CLOSEOUT.
 - 1. Drawings indicating the extent and depth of all engineered fill, and overexcavation and recompaction. This information shall be a part of the Project "As-Built" and Project "Record" Documents in accordance with the Specification Section PROJECT DOCUMENTS.

1.6 QUALITY ASSURANCE

A. Installer:

- 1. Qualifications:
 - a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this project within the past 5 years.

B. Regulatory Requirements:

1. In accordance with Specification Section REGULATORY REQUIREMENTS and the following:

a.	CARB	Materials and equipment used for this Project shall comply with
		the current applicable regulations of the California Air Resources
		Board [CARB].

b. CM City of Madera, Codes and Ordinancesc. EPA Environmental Protection Agency.

d. CAL/OSHA Comply with all provisions of the Construction Safety Orders and the General Safety Orders of the California Division of Occupational Safety and Health, as well as all other applicable regulations as they pertain to the protection of workers from the

hazard of caving ground excavations.

e. DTSC Comply with all recommendations of the California Department of Toxic Substance Control (DTSC) regarding soil testing for

potential contaminants.

C. Certificates:

- 1. Installer's certification that all Earthwork installation meets or exceeds the requirements of this specification.
- 2. Contractor's certification (on Contractor's letterhead paper) that the Earthwork materials and installation meets or exceeds the requirements of this specification.

D. Meetings:

- 1. Pre-Installation: Schedule prior to the start of work.
 - a. Coordinate the work with other work being performed.
 - b. Identify any potential problems, which may impede planned progress and proper installation of work regarding quality of installation and warranty requirements.
- 2. Progress: Scheduled by the Contractor during the performance of the work.
 - a. Review for proper installation of work progress.
 - b. Identify any installation problems and acceptable corrective measures.
 - c. Identify any measures to maintain or regain project schedule if necessary.
- 3. Completion: Scheduled by the Contractor upon proper completion of the work.
 - a. Inspect and identify any problems which may impede issuance of warranties or guaranties.
 - b. Maintain installed work until the Notice of Substantial Completion has been filed.

1.7 COORDINATION

- A. Coordinate work with Owner's personnel.
- B. Provide required notification to the Owner and Geotechnical Engineer or the Engineer of Record so that a representative from the Owner's Geotechnical Engineering consultant can be present for all excavation, filling and grading operations to test and observe earthwork construction.
- C. Verify that the location of existing utilities has been indicated at work site by utility authorities, by Owner, and as specified on the Plans.

1.8 EXISTING CONDITIONS

A. Existing Conditions:

- 1. Examine the site and verify conditions with the Drawings and Specifications. Contractor shall familiarize himself with existing site conditions and any changes that have occurred at the site since the preparation of the contract documents and shall be responsible to account for any such changes in the price bid for this work.
- 2. Thoroughly investigate and verify conditions under which the Work is to be performed.
- 3. Locate and identify utilities:
 - a. Call a Local Utility Locator Service (USA "Underground Service Alert" [800] 227-2600) for the task of locating any applicable off-site and on-site utilities in the area where the Project is located.
- 4. No allowance for Extra Work will be granted resulting from negligence or failure to meet requirements of this Section.
- B. Where subsurface work involves more than the normal depth of excavation required for the removal and/or construction of surface improvements (surface improvements such as concrete flatwork, paving, landscaping, signs, etc.), the Engineer will have made a diligent attempt to indicate on the plans the location of all main and trunk line utility facilities which may affect the Work. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.
- C. Under similar circumstance, service laterals and appurtenances will have also been shown where information was available as to their location. In many cases, however, the only available information relative to the existing location of said facilities may have been small scale undimensioned plats. The locations of said facilities, therefore, shall be considered approximate only, until exposed by the Contractor.
- D. Determine exact location of existing buried utilities by:
 - 1. Marking on ground or pavement surface the alignment and extent of the facilities and the probable location of existing utilities using construction plans and existing surface features.
 - 2. Requesting Underground Service Alert (USA) to indicate location of existing buried facilities (phone 1-800-227-2600). Provide USA a minimum of two (2) working days notice of request for locations and notify Owner of said request concurrently.
 - 3. Confirm exact location of existing utilities by hand methods of excavation, or by use of vacuum equipment.
- E. At proposed work location, expose by hand methods (or vacuum equipment) all existing utilities along the route of the proposed work prior to using any mechanical equipment. If mechanical equipment is allowed at a particular location, it may only be used after the completion by the Contractor of a successful exhaustive search by hand (or vacuum equipment) methods to locate all existing facilities as indicated on the plans, and/or as indicated on the ground by USA or Owner's personnel.

BCF 223-0123 312000 - 4 3/31/2023 2:21 PM

- F. Provide Field Engineering to record the location of all utilities encountered. Where locational conflicts exist between existing utilities and the planned location of facilities to be constructed under this Contract, submit detailed information to the Engineer for review and direction.
- G. Maintain all existing utility mains and service lines in constant service during construction of the Work.
- H. Where service disruptions are allowed, minimize the length of such disruptions by proper scheduling and diligent pursuit of the work, and coordinate the timing of any such disruptions in advance with the District.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.
 - 1. All disturbed areas, including storage piles, which are not being actively utilized for construction purposes, shall be effectively stabilized of dust emissions using water, chemical stabilizer/suppressant, or vegetative ground cover.
 - 2. All land clearing, demolition, grubbing, scraping, excavation, land leveling, grading, and cut and fill activities shall be effectively controlled of fugitive dust emissions utilizing application of water or by pre-soaking.
 - 3. When materials are transported off-site, all material shall be covered, effectively wetted to limit visible dust emissions or at least six inches of freeboard space from the top of the container shall be maintained.
 - 4. All operations shall limit or expeditiously remove the accumulation of mud or dirt from adjacent public streets at least once every 24 hours when operations are occurring. The use of dry rotary brushes is expressly prohibited except where preceded or accompanied by sufficient wetting to limit the visible dust emissions. The use of blower devices is expressly forbidden.
 - 5. Following the addition of materials to, or the removal of materials from, the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions utilizing sufficient water or chemical stabilizer/ suppressant.
 - a. Contractor shall comply with all requirements of the San Joaquin Valley Air Pollution Control District (SJVAPCD) for construction activity related to this project.
 - b. A Dust Control Plan, as required by the SJVAPCD, may be required for this project. If required, Contractor shall be responsible for preparing said Dust Control Plan, submitting to the SJVAPCD for review and approval, and paying all SJVAPCD review and permitting fees related to the Dust Control Plan.
 - c. If a dust control plan is required, no construction activity related to this project may begin until Contractor has secured an approved Dust Control Plan.
 - d. Contractor shall be solely responsible to implement all requirements of the Dust Control Plan throughout the life of this contract.

- e. Should fines or fees be levied against the Project for violations of the Dust Control Plan and/or related SJVAPCD regulations, Contractor shall be responsible to pay all said fines or fees and to implement all mitigation measures required by SJVAPCD in order to bring the construction activity into compliance with SJVAPCD regulations. The costs for any such fines or fees shall be included in the lump sum price bid for work under this contract and no additional payment will be made therefore
- B. Burning: No burning will be allowed on-site.
- C. Rain: Work under this section shall not be started or maintained under threat of rain, unless the work is not affected by the rain.
- D. Do not place fill during weather conditions which will alter moisture content of fill materials sufficiently to make compaction to the specified densities difficult or impossible.
- E. When reference is made to SWPPP (Storm Water Pollution Prevention Plan), if any within this Project Manual, then comply with all environmental protection requirements included therein.
- F. In accordance with EPA, CARB and CM.

G. Protection:

- 1. Protect cut and fill areas to prevent water running into excavation. Maintain areas free of water. Remove seeping water immediately by pumps. Provide dewatering as necessary.
- 2. Protect cut slopes from erosion due to precipitation and other sources of runoff.
- 3. Protect utilities to remain within the construction area and special construction. If utility lines are uncovered (water, electric, sewer, etc.) not shown on the drawings during excavation of site, notify the Architect promptly for its review and action.
- 4. Do not permit access to undeveloped portions of the site, nor to areas that are outside of the limits of grading.
- H. Before being brought onto the site, all import soil must be sampled, tested and approved by Owner's Geotechnical Engineer. All import material must comply with DTSC recommendations and guidelines for environmentally clean soil suitable for school construction. Import testing will be provided and paid for by the Owner.

1.10 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of GENERAL CONDITIONS and DIVISION 1, GENERAL REQUIREMENTS.
- B. Accurately record actual locations of utilities encountered including depth and horizontal location, as measured from permanent site features.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Fill in Turf or Other Planting Areas: Type S2 or S3 per Division 31 Specification Section SOIL MATERIALS.
- B. Fill in Non-planting Areas: Type S1, S2 or S4 per Division 31 Specification Section SOIL MATERIALS.
- C. Imported material: Type S3, S4 or S5 per Division 31 Specification Section SOIL MATERIALS.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions.

3.2 PREPARATION

A. Layout of Work:

- 1. Contractor shall be responsible for all lines and grades. Layout shall be provided by a California registered Land Surveyor or Civil Engineer, at Contractor's expense.
- 2. Check all benchmarks, monuments and property lines and verify locations.
- 3. Locate and maintain all grade stakes.
- 4. Monuments moved or displaced during grading operation are to be replaced by a California Registered Civil Engineer or Surveyor, at Contractor's expense.
- B. Locate, identify, and protect existing above and below grade utilities from damage.
- C. Protect plant life, lawns, trees, shrubs, and other features not authorized for removal.
- D. Protect existing structures, fences, curbs, sidewalks, paving and other improvements to remain from damage from excavation equipment and vehicular traffic.
- E. Employ equipment and methods appropriate to the work site.
- F. Protect excavated areas from drainage inflow and provide for drainage of all excavated areas.
- G. Comply with all provisions of the Construction Safety Orders and General Safety Orders of the California Division of Industrial Safety, as well as all other applicable regulations as they pertain to the protection of workers from the hazard of caving ground in excavations.

3.3 SITE STRIPPING:

- A. Reference is made to Division 31 Specification Section SELECTIVE DEMOLITION.
- B. Within the areas of planned surface improvements and structures, the near surface soils containing vegetation, roots, organics, or other objectionable material must be stripped and removed from the site. Upon approval of the Geotechnical Engineer, suitable materials stripped from the site may stockpiled and incorporated into the finish fill for planting areas.
- C. All areas to receive surface improvements shall be stripped to remove turf, shrubs, trees and other vegetation, along with associated root systems, concrete, wood, metal, rubbish and other unsuitable debris, and any loose, saturated or unconsolidated soil material. Stripping shall continue to the depth required to expose acceptable basement soils that are free from deleterious which are not suitable for Engineered Fill, as required by the Geotechnical Engineer.

3.4 EXCAVATION

- A. Following clearing and stripping operations, excavate planned construction areas as specified in this Section.
- B. Provide additional excavation as required to conform to the lines, grades and cross-sections shown on the plans.
- C. When excavating through tree roots, perform work by hand and cut roots, where authorized, with a saw. Remove all roots 1/4" in diameter and greater.
- D. Remove excess soil not to be used as fill in the Work from the site. Unless requested by Owner to be deposited at a site designated by Owner on the property, obtain a disposal site and legally dispose of said excess material, all at no additional cost to the Owner.
- E. Areas disturbed by demolition must be excavated to expose undisturbed soils.
- F. Excavated soils free of deleterious substances (organic matter, demolition debris, tree roots, etc.) and with less than 3% organic content by weight, may be returned to the excavations as Engineered Fill.

3.5 FILLING AND COMPACTING

- A. Once clearing, stripping and over-excavation operations are complete, scarify the surface to receive fill material or improvements to a depth of 8-inches, moisture condition to at least 2% above optimum moisture content, and compact to a minimum of 90% of maximum dry density based on ASTM Test Method 1557.
- B. Place and compact soil to finish subgrade of improvements to be placed thereon, or to finished surface grade where no improvements are to be placed thereon.
- C. All fill required shall be placed as Engineered Fill.

- D. The Contractor shall be solely responsible for securing an acceptable source of import material as required to grade the site. Reference is made to 31 20 00 1.9.H
- E. On-site soils are suitable for re-use as Engineered Fill, providing they are cleansed of excessive organics (less than 3 percent by weight, ASTM D2974), debris, and fragments larger than three (3) inches in maximum dimension and meet the requirements of soil Type S4, Division 31 Specification Section SOIL MATERIALS.
- F. Engineered Fill shall be moisture conditioned to within 2% of optimum moisture, placed in uncompacted layers not exceeding eight (8) inches in thickness, and compacted as specified, based on ASTM Test Method D1557.
 - 1. Non-vegetative surface improvement areas (structures and site concrete improvements) To a minimum of 90% of maximum dry density.
 - 2. Vegetative surface improvement areas (turf and planters) Below top twelve (12) inches to a minimum of 90% of maximum dry density. Top twelve (12) inches 85% of maximum dry density (relative compaction).
 - 3. Pavement areas: to a minimum 95% of maximum dry density in top twelve (12) inches.
- G. Maintain optimum moisture content of fill materials to attain required compaction density.
- H. Additional lifts shall not be placed if the previous lift did not meet the required dry density, or if soil conditions are not stable.
- I. Conform fill to the lines, grades and cross-sections shown on the plans.
- J. Fill materials to conform to Division 31 Specification Section SOIL MATERIALS.
- K. Provide, at no additional cost to Owner, imported soil material conforming to the requirements of Division 31 Specification Section SOIL MATERIALS, as needed to attain finished grades of Work.
- L. Utilize equipment which will not disturb or damage existing utilities and other improvements.

3.6 PREPARATION OF SUBGRADE FOR SURFACE IMPROVEMENTS

- A. Where concrete, asphalt-concrete, aggregate base, or other non-vegetative surface improvements, or a layer of said surface improvements, are to be constructed on the soil surface, prepare the subgrade for said improvements in accordance with this section.
- B. Scarify the soil as specified and remove and dispose of (off the project site) all rocks, hardpan chunks or otherwise unsuitable material over 3-inches in size.
- C. Thoroughly moisture condition and compact as described above.
- D. Prior to commencing construction of surface improvements, pass a test roller of size and weight as approved by the Owner over the subgrade to establish the extent of soft or spongy areas requiring repairs.
- E. Conform finished subgrade surface to the lines, grades and cross-sections shown on the plans.

3.7 FINE GRADING

- A. Fine grade all finished surfaces to the lines, grades and cross-sections shown on the plans, and to blend to hard surface improvements.
- B. Rake and smooth all finished surfaces not to receive hard surface improvements.
- C. Use suitable stockpiled or imported topsoil for the top 12-inches of areas to receive landscape improvements.
- D. Import topsoil meeting the requirements of Division 31 Specification Section SOIL MATERIALS, as required to complete finish grading.
- E. Topsoil may not be used in areas requiring Engineered Fill.

3.8 TOLERANCES

- A. Top surface of Subgrade for Non-Vegetative Surface Improvements or Layers thereof: Plus or minus 0.02 foot from planned elevation.
- B. Top surface of Subgrade for Vegetative Surface Improvements or for Bare Ground Plus or minus 0.05 foot of planned elevation, or as required for finish surface to match adjacent improvements or ground.

3.9 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of GENERAL CONDITIONS and/or DIVISION 1, GENERAL REQUIREMENTS.
- B. Compaction testing will be performed in accordance with ANSI/ASTM D1557.
- C. If tests indicate work does not meet specified requirements, recompact, or remove and replace, and retest.
- D. All retesting required as a result of failure of initial test will be performed by Owner's testing agency, at the expense of the Contractor.

3.10 PROTECTION

- A. Protect graded areas from traffic, freezing, erosion, and all other sources of damage. Keep free of debris and trash.
- B. Repair and re-establish grades to specified tolerances where completed or partially completed work becomes eroded, rutted, settled, or where it is damaged by subsequent construction operations or weather.
- C. Where settlement occurs prior to acceptance of the work, remove and replace surface improvements, excavate, replace, and re-compact in accordance with these specifications, and restore the surface improvements.

3.11 CLEANING

A. Remove all surplus or unsatisfactory soil material, trash, and debris, and legally dispose of off of the Owner's property.

END OF SECTION

INTENTIONALLY LEFT BLANK

SECTION 312222 - SOIL MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY:

A. SECTION INCLUDES

1. Excavated (and re-used) materials and imported materials.

1.3 RELATED SECTIONS:

1. Section 31 20 00 - Earthwork: Excavation, Filling and Grading.

1.4 SUBMITTALS

- A. Samples: Submit, in air-tight containers, 10 lb. sample of Type S3, S4 and S5 fill to inspector.
- B. Soil Analysis: Submit for Type S3, S4 and S5 soils to be imported.
- C. Materials Source: Submit location of imported materials source. Provide materials from same source throughout the work. Change of source requires approval.
- D. For imported soil, obtain Geotechnical Engineer and District approval prior to importing.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Soil Type S1: Excavated and reused material, graded; free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
- B. Soil Type S2: Excavated and reused material, graded; free of roots, lumps greater than one inch, rocks larger than 1/2 inch, debris, weeds and foreign matter.
- C. Soil Type S3: Imported topsoil, friable loam; reasonably free of roots, rocks larger than ½ inch, debris, weeds, and foreign matter.

- D. Soil Type S4: Imported borrow, suitable for purposes intended, meeting the following characteristics:
 - 1. Maximum Particle Size: 3"
 - 2. Percent Passing #4 Sieve: 65-100
 - 3. Percent Passing #200 Sieve: 20-45
 - 4. Expansion Index: <20
 - 5. Plasticity Index: <12
 - 6. Low Corrosion Potential:
 - a. Soluble Sulfates: <1,500 mg/Kg
 b. Soluble Chlorides: <300 mg/Kg
 c. Soil Resistivity: >5,000 ohm-cm
- E. Soil Type S5: Imported sand. Natural river or bank sand (sand equivalent greater than 30), washed; free of silt, clay, loam, friable or soluble materials, and organic matter.

2.2 SOURCE QUALITY CONTROL

A. Inspection of imported soil will be performed by the Geotechnical Engineer, at source of import and prior to being delivered to the site.

PART 3 - EXECUTION

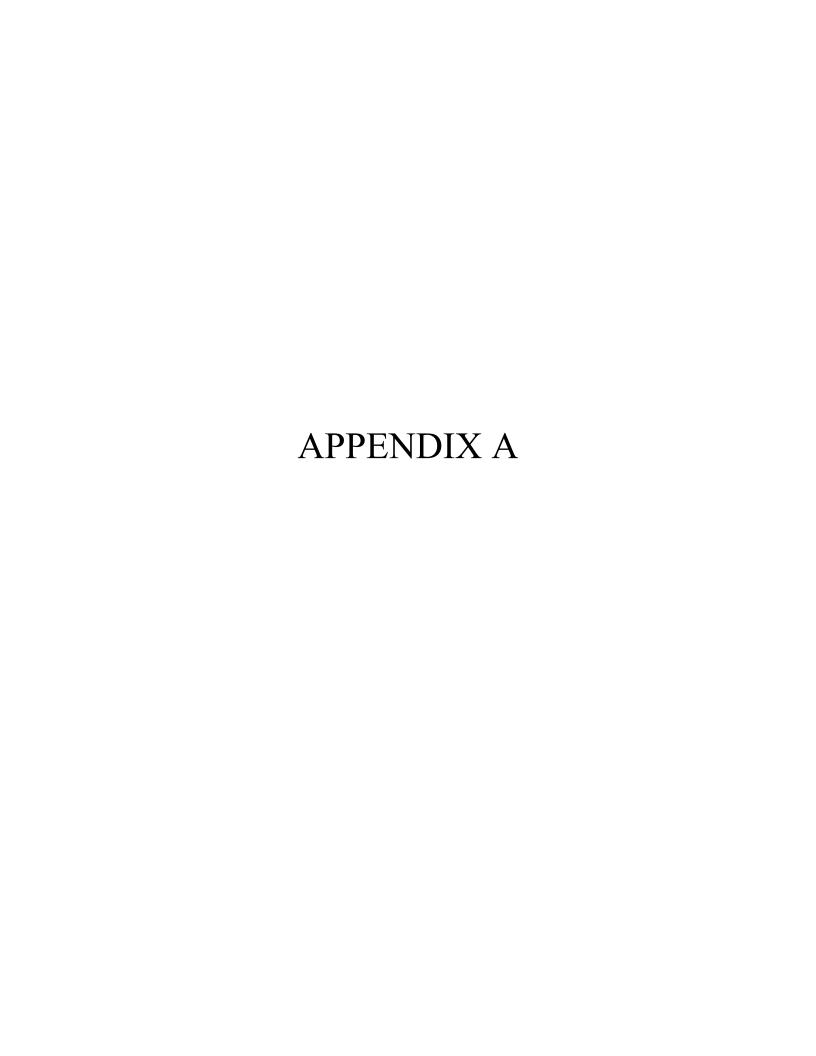
3.1 STOCKPILING

- A. Stockpile excavated or imported material onsite at location designated by project inspector.
- B. Stockpile excavated or imported material in sufficient quantities to meet project schedule and requirements.

3.2 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.
- B. Dispose of excess material off-site.

END OF SECTION



INTENTIONALLY LEFT BLANK

Project: Thomas Jefferson Middle School Kitchen Remodel Darden Project #2123

Client: Madera Unified School District

Location: Madera, CA

APPENDIX "A": INTERIOR COLOR SCHEDULE, BUILDING C

<u>MATERIAL</u>	MANUFACTURER	REF#	DESCRIPTION
MODULAR CASEWORK			
Plastic Laminate (PL-1)	Wilsonart	1573-60	Frosty White
Acrylic Panel	3-Form	Height Tabula	1/4" Gage, Install Horizontally
Refer to attached drawing Detail	il J4/X/A412 and Interior Elevation	ons.	
TILE			
Ceramic, Interior Floor Tile			
CT-1	Dal Tile	D200	Keystones, 2x2
Grout to be Custom Building Pl	roducts 543 Driftwood.		Desert Gray Speckle
Ceramic, Interior Wall Tile			
CT-2	Dal Tile	0190	Arctic White, 4 1/4" x 4 1/4"
CT-3	Dal Tile, Color Wheel Liner	0190	Arctic White, 4" x 12"
CT-4	Dal Tile, Color Wheel Liner	K189	Navy, 4" x 12"
Grout to be Custom Building Pi			, , <u>,</u>
	Location of CT-2, CT-3 and CT-4		
RESILIENT BASE AND ACCESSORIES			
Rubber Base			
Color 1	Mannington Commercial	_	Match to Adjacent Existing Base
@ Multi Purpose Room Only. B	ase to match to existing color, h	eight and profile.	, 3
Color 2	Mannington Commercial	660	Rocky
RESINOUS FLOORING			
Resinous Floor (RF_1 & RF_2)	Stonehard	Stoneshield	Steel Gray
WALL COVERINGS			
Fiberglass Reinforced Panels	Nudo	-	White
PAINT			
Gypsum Board (New and Existir	ng)		
Color 1	PPG	TBD	TBD
Unless otherwise noted.			
Color 2	PPG	TBD	TBD
Refer to Inteior Elevations for L	ocation.		
Metal Doors/Frames			
Metal Doors/Frames	PPG	TBD	TBD
Unless Otherwise Noted			
Steel and Fabrications	PPG		Paint to match to adjacent surface.

© Darden Architects Last printed: 2/13/2023 2:59 PM

INTENTIONALLY LEFT BLANK