

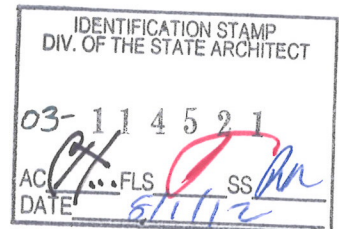
PROJECT MANUAL CONTRACTUAL-LEGAL REQUIREMENTS SPECIFICATIONS

MT. VERNON ELEMENTARY SCHOOL KITCHEN ADDITION BAKERSFIELD CITY SCHOOL DISTRICT



Project No. 3990 Set No. _____

CURTIS E. FLYNN
Project Architect



Integrated Designs by SOMAM, Inc.
6011 N. Fresno Street, Suite 130
Fresno, California 93710

DOCUMENTS REQUIRED LIST FOR PROJECT CERTIFICATION - ORS-6 (3/95)

PROJECT NAME: Mt Vernon

FILE NO: 15-6 APPLICATION NO: 03-114521 NAME OF A/E: Integrated

PROJECT INFORMATION

REQ'D	REC'D	NOT REC'D	ITEM	COMMENTS
<input checked="" type="checkbox"/>			FORM SSS-5 (PROJECT/SITE)	FOR PROJECT/SITE INSPECTOR(S)
			FORM SSS-5 (IN-PLANT)	FOR RELOCATABLE BUILDINGS ONLY
X			FORM SSS 102	CONTRACT INFORMATION

FINAL VERIFIED REPORT (FORM SSS-6A/E)

REQ'D	REC'D	NOT REC'D	FINAL VERIFIED REPORTS	COMMENTS
<input checked="" type="checkbox"/>			ARCHITECT	
			STRUCTURAL ENGINEER	
<input checked="" type="checkbox"/>			MECHANICAL ENGINEER	
			ELECTRICAL ENGINEER	

FINAL VERIFIED REPORT (FORM SSS-6)

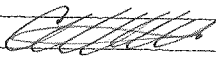
REQ'D	REC'D	NOT REC'D	FINAL VERIFIED REPORTS (FORM SSS-6)	COMMENTS
<input checked="" type="checkbox"/>			PROJECT/SITE INSPECTOR(S)	
X			CONTRACTOR	FROM EACH CONTRACTOR
<input checked="" type="checkbox"/>			IN-PLANT INSPECTOR	FOR RELOCATABLE BUILDINGS ONLY
			SPECIAL INSPECTOR(S)	

OTHER FINAL VERIFIED REPORTS / AFFIDAVITS

REQ'D	REC'D	NOT REC'D	FINAL VERIFIED REPORTS / AFFIDAVITS	COMMENTS
<input checked="" type="checkbox"/>			LABORATORY	TO BE SIGNED BY LEA LAB PROFESSIONAL ENGR
			SHOP WELDING & FABRICATION	TO BE SIGNED BY AWS/CWI WELDING INSPECTOR
			FIELD WELDING	TO BE SIGNED BY AWS/CWI WELDING INSPECTOR
			HIGH STRENGTH BOLT INSTALLATION	
			GLULAM FABRICATION	
<input checked="" type="checkbox"/>			MANUFACTURED TRUSSES	
			MASONRY INSPECTION	
			ENGINEERED FILL	TO BE SIGNED BY GEOTECHNICAL ENGINEER
			BLEACHER FABRICATION	
			OTHER:	
			OTHER:	
			OTHER:	

OTHER DOCUMENTS

REQ'D	REC'D	NOT REC'D	ITEMS	COMMENTS
X			FURTHER FEES	SEE ATTACHED INVOICE
			NOTICE OF COMPLETION	TO BE SIGNED BY SCHOOL DISTRICT/OWNER
			WEIGHMASTER CERTIFICATE	
			AUTOMATIC SPRINKLER SYSTEM D.A	DEFERRED APPROVAL ITEM
			FIRE ALARM SYSTEM D.A	DEFERRED APPROVAL ITEM
			FIRE ALARM SYSTEM COMPONENTS D.A	DEFERRED APPROVAL ITEM
			FIRE STANDPIPE D.A	DEFERRED APPROVAL ITEM
			FIRE SUPPRESSION SYSTEM D.A	DEFERRED APPROVAL ITEM
			SMOKE VENTILATOR D.A	DEFERRED APPROVAL ITEM
			SKYLIGHTS D.A	DEFERRED APPROVAL ITEM
			BLEACHERS D.A	DEFERRED APPROVAL ITEM
			OTHER DEFERRED APPROVAL ITEMS	
			CHANGEORDERS	
			CHANGEORDERS	
			OTHER	
			OTHER	
			OTHER	

SIGNATURE OF A/E:  DATE: 8/1/12

FOR 60DAY LETTER
PREPARATION BY: _____ DATE: _____

OTHER REQUIREMENTS / DEFICIENCIES



Division of the
State Architect
CALIFORNIA DEPARTMENT OF GENERAL SERVICES

FORM **DSA-103** rev 5/11
Statement of Structural Tests and Special Inspections
2010 CBC

INCREMENT #
 DSA File No.:
 Application No.:
 Date Submitted:
 Revised:
 Revised:

School Name: **Mt. Vernon Elementary School** District: **Bakersfield City School District**

IMPORTANT: This form is only a summary list of structural tests and special inspections required for the project. The actual tests and inspections must be performed as detailed on the DSA approved documents. The project inspector is responsible for providing inspection of all facets of construction, including but not limited to, special inspections not listed on this form such as structural wood framing, high-load wood diaphragms, cold-formed steel framing, anchorage of non-structural components, etc., per Title 24, Part 2, Chapter 17A. NOTE: This form is also available for projects submitted for review under the 2007 CBC.

INSTRUCTIONS: Click a plus sign (+) before any category or subcategory to reveal additional tests and special inspections. An "X" before a listed test or inspection indicates it is a mandatory requirement. A shaded box indicates a test or special inspection that may be required, depending on the scope of the construction and other issues. A shaded box can be clicked indicating your selection of that test. Note: A minus (-) on a category or subcategory heading indicates that it can be collapsed. However, any selections you may have made will be cleared. Click on the "COMPILE" button to show only the tests finally selected. For more information on use of this form, see DSA-103.INSTR.

Note: All references to the California Building Code (CBC) are to the 2010 edition.

REQUIRED	TEST OR SPECIAL INSPECTION	TYPE 1	PERFORMED BY 2	CODE REFERENCE AND NOTES
-	SOILS			
	1. GENERAL:	Table 1704A.7		
	a. Verify that: <ul style="list-style-type: none"> • site has been prepared properly prior to placement of controlled fill and/or excavations for foundations, • foundation excavations are extended to proper depth and have reached proper material, and • materials below footings are adequate to achieve the design bearing capacity. 	Periodic	GE*	* By geotechnical engineer or his or her qualified representative.
	2. COMPACTED FILLS:	Table 1704A.7		
X	b. Verify use of proper materials and inspect lift thicknesses, placement, and compaction during placement of fill.	Continuous	GE*	* By geotechnical engineer or his or her qualified representative.
X	c. Test compaction of fill.	Test	Lab*	* Under the supervision of the geotechnical engineer.
-	CONCRETE	Table 1704A.4		
	7. CAST IN PLACE CONCRETE			
	Material Verification and Testing:			
X	a. Verify use of required design mix.	Periodic	SI & P1*	* To be performed by batch-plant special inspector and project inspector.
X	b. Test reinforcing steel.	Test	Lab	1916A.2 (1916.1.6*), ASTM A370. See IR 17-10
X	c. Perform slump, temperature, and (where required) air content tests.	Test	Lab	ASTM C172, ASTM C31.
X	d. Test concrete (compression).	Test	Lab	1905A.6 (1905.6*), ASTM C39.
	Inspection:			
X	e. Inspect batching of concrete.	Continuous	SI	1704A.4.2; (see 1704A.4.3, option 2 for waiver based on design parameters).



Division of the
State Architect
 CALIFORNIA DEPARTMENT OF GENERAL SERVICES

FORM **DSA-103** rev 5/11
**Statement of Structural Tests
 and Special Inspections**
 2010 CBC

INCREMENT #
 DSA File No.:
 Application No.:
 Date Submitted: 4/25/2012
 Revised: 15-6
 Revised: 03-114521
 Revised:

X	f. Inspect placement of formwork, reinforcing steel, embedded items and concrete. Inspect curing and form removal.	Continuous	PI*	* May be performed by a special inspector when specifically approved by DSA.	
-	11. POST-INSTALLED ANCHORS:				
X	a. Inspect installation of post-installed anchors	Continuous	PI	Table 1704A.4	
X	b. Test post-installed anchors.	Test	Lab	1916A.7 (1916.1.11*)	
+	MASONRY	Table 1704A.5.3			
+	STEEL	Table 1704A.3			
-	WOOD				
+	OTHER	Section 1704A.15			



Division of the
State Architect
CALIFORNIA DEPARTMENT OF GENERAL SERVICES

FORM **DSA-103** rev 5/11
**Statement of Structural Tests
and Special Inspections**
2010 CBC

INCREMENT # DSA File No.:

Application No.:

Date Submitted: Revised:

- 1 Soils testing and Inspection: Geotechnical Verified Report - Form DSA-293
- 2 All Structural Testing: Laboratory Verified Report - Form DSA-291
- 3 Concrete Batch Plant Inspection: Special Inspection Verified Report - Form DSA-292

1	Type -	2	Performed By -
	Continuous - Indicates that a continuous special inspection is required	GE - Indicates that the special inspection is to be performed by a registered geotechnical engineer or his or her authorized representative	
	Periodic - Indicates that a periodic special inspection is required	Lab - Indicates that the test is to be performed by a testing laboratory accepted in the DSA laboratory Evaluation and Acceptance (LEA) Program	
	Test - Indicates that a test is required	PI - Indicates that the special inspection is to be performed by the project inspector	
	(Note: The difference between "asis" and "special inspections" is addressed in IR 17-4)	SI - Indicates that the special inspection is to be performed by a special inspector	
COMPLETE		(Note that reassignment of responsibility is permitted only with the written approval of DSA)	

Curtis Flynn
Name of Architect or Engineer in general responsible charge
Tony Wu
Name of Structural Engineer (When structural design has been delegated)

Signature of Architect or Structural Engineer *[Signature]* date 8/1/12

Architect or Structural Engineer Stamp

IDENTIFICATION STAMP
DIV OF THE STATE ARCHITECT

AC N/A FLS N/A SS OK
APP. # 53-114521
DATE 8/1/12

SCHOOLS LEGAL SERVICE

BID PACKAGE TABLE OF CONTENTS

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03	Bid Form
04	Substitution Listing
05	List of Subcontractors
06	Bid Bond
07	Non-Collusion Affidavit
08	Exclusion of Asbestos Products
09s	Construction Agreement [Small Projects]
12	Payment Bond
13	Performance Bond
14	Worker's Compensation Certificate
15	Guarantee
16	Fingerprinting Certification by Contractors
17	Exclusion of Lead Products
18	Davis Bacon Compliance Certification
19	Escrow Agreement
20	Shop Drawing Transmittal
21	Drug-Free Workplace Certification
22	Change Order Form
23	Certificate of Attendance at Mandatory Job Walk
24	Contractors' Qualifications Questionnaire
	DVBE Forms

NOTICE TO CONTRACTORS CALLING FOR BIDS

Notice is hereby given that Bakersfield City School District (hereinafter referred to as "Owner") will receive sealed bids prior to the date and time stated for the Bid Opening for:

**Mt. Vernon Elementary School
Kitchen Addition
2161 Potomac Avenue
Bakersfield, California 93307-2426**

PROJECT DESCRIPTION: The contract is for a Kitchen Addition

The project is anticipated to start on approximately _____, 2012 and is anticipated to have a duration of _____ calendar days.

	<u>Date</u>	<u>Time</u>
BID DEADLINE:		
PLACE OF BID RECEIPT:	<u>Bakersfield City School District</u> <u>School Planning and Construction</u> <u>1501 Feliz Drive</u> <u>Bakersfield, California 93307</u>	

METHOD OF BID RECEIPT: Personal Delivery, or Courier, or Mailed via United States Postal Service to above address. Facsimile Submittals Strictly Prohibited.

WHERE TO PICK UP PLANS: The plans and specifications are available for purchase at Blueprint Service Company, 1100 18th Street, Bakersfield, Ca. 93301. Phone, 661-327-2501, Fax 661-327-9265. This purchase is non-refundable. Contractor will be responsible for all costs relating to purchase of plans and specifications as well as all costs for deliveries utilizing a third party company. Plans and specifications are also available for download at the District's web site.
<http://www.bcsd.com/maintenance/construction>

Bids will be received for demolition, earthwork, foundations, site improvements, utilities, landscape & irrigation and electrical work at the existing elementary school campus.

SEALED BID MARKING: Kitchen Addition at Mt. Vernon Elementary School

The lowest bid shall be determined:

1. On the lowest bid price on base contract.

The District reserves the right to add or deduct any additive or deductive items after the lowest responsible and responsive bidder is determined.

"MANDATORY" PRE-BID JOB WALK:

Meet at: Parking Lot
Location: Mt. Vernon Elementary School
2161 Potomac Avenue
Bakersfield, California

The "Mandatory" Pre-Bid Job Walk will provide the opportunity to inspect the site and may include dissemination of additional information in response to questions. All bidders will be deemed to have notice of all conditions and information, including but not limited to any conditions in, at, and about the site, the building or buildings, if any, and any work that may have been done thereon.

The Owner will require the successful Bidder to achieve the minimum goal of 3% DVBE (Disabled Veteran Business Enterprises) established in the bidding documents or to provide acceptable evidence of good faith efforts to do so. The DVBE documents must be sealed and filed in the Offices of the Owner before the bid deadline, at which time the bids (including the DVBE forms) will be opened in public.

This is a prevailing wage project. OWNER has ascertained the general prevailing rate of per diem wages in the locality in which this work is to be performed for each craft or type of worker needed to execute this contract. These rates are on file at OWNER's office, and a copy may be obtained upon request. A copy of these rates shall be posted at the job site.

It shall be mandatory upon the contractor to whom the contract is awarded (CONTRACTOR), and upon any subcontractor, to pay not less than the specified rates to all workers employed by them in the execution of the contract.

A Payment Bond for contracts over \$25,000 and a Performance Bond for all contracts will be required prior to commencement of work. These bonds shall be in the amounts and form called for in the Contract Documents.

Pursuant to the provisions of Public Contract Code Section 22300, CONTRACTOR may substitute certain securities for any funds withheld by OWNER to ensure CONTRACTOR's performance under the contract. At the request and expense of CONTRACTOR,

securities equivalent to any amount withheld shall be deposited, at the discretion of OWNER, with either OWNER or a state or federally chartered bank as the escrow agent, who shall then pay any funds otherwise subject to retention to CONTRACTOR. Upon satisfactory completion of the contract, the securities shall be returned to CONTRACTOR.

Securities eligible for investment shall include those listed in Government Code Section 16430, bank and savings and loan certificates of deposit, interest bearing demand deposit accounts, standby letters of credit, or any other security mutually agreed to by CONTRACTOR and OWNER. CONTRACTOR shall be the beneficial owner of any securities substituted for funds withheld and shall receive any interest on them. The escrow agreement shall be in the form indicated in the Contract Documents.

To perform the work required by this Notice, CONTRACTOR must possess a valid and active contractor's license of the following type: "B".

The following notice is given as required by Labor Code Section 1771.5(b)(1): CONTRACTOR and any subcontractors are required to review and comply with the provisions of the California Labor Code, Part 7, Chapter 1, beginning with Section 1720, as more fully discussed in the Contract Documents. These sections contain specific requirements concerning, for example, determination and payment of prevailing wages, retention, inspection, and auditing payroll records, use of apprentices, payment of overtime compensation, securing workers' compensation insurance, and various criminal penalties or fines which may be imposed for violations of the requirements of the chapter. Submission of a bid constitutes CONTRACTOR's representation that CONTRACTOR has thoroughly reviewed these requirements.

The Labor Compliance Program required by state law and regulations and the Director of the Department of Industrial Relations will be enforced.

The Owner reserves the right to waive any irregularity and to reject any or all bids.

Unless otherwise required by law, no bidder may withdraw its bid for a period of sixty (60) days after the date set for the opening thereof. The Owner reserves the right to take more than sixty (60) days to make a decision regarding the rejection of bids or the award of the Contract.

Advertise: _____, 2012
_____, 2012

Bakersfield City School District
Mike Lingo, Superintendent

02-INSTRUCTIONS TO BIDDERS

**WARNING: READ THIS DOCUMENT CAREFULLY
DO NOT ASSUME THAT IT IS THE SAME AS OTHER
SIMILAR DOCUMENTS YOU MAY HAVE SEEN
EVEN IF FROM THE SAME OWNER**

PROJECT TITLE: Kitchen Addition at Mt. Vernon Elementary School

OWNER: Bakersfield City School District

1. Preparation of Bid Form.

The Owner invites bids on the form attached to be submitted at the time and place stated in the Notice to Contractors Calling for Bids. Bids shall be submitted on the prescribed Bid Form, completed in full. All bid items and statements shall be properly and legibly filled out. Numbers shall be stated both in words and in figures where so indicated, and where there is a conflict in the words and the figures, the words shall govern. The signatures of all persons shall be in longhand. Prices, wording, and notations must be in ink or typewritten.

2. Form and Delivery of Bids.

The bid must conform to and be responsive to all Contract Documents and shall be made on the Bid Form provided. The complete bid, together with any additional materials required, shall be enclosed in a sealed envelope, addressed and hand-delivered or mailed to the Owner at the address set forth in the Notice to Contractors Calling for Bids, and must be received on or before the time set for the opening of bids. The envelope shall be plainly marked in the upper left-hand corner with the bidder's name, the project designation, and the date and time for the opening of bids. It is the bidder's sole responsibility to ensure that its bid is received prior to the bid deadline. In accordance with Government Code Section 53068, any bid received after the scheduled closing time for receipt of bids shall be returned to the bidder unopened.

At the time set for the opening of bids, the sealed bids will be opened and publicly read aloud at the place indicated in the Notice to Contractors Calling for Bids. However, if this project calls for prequalification of bidders pursuant to Public Contract Code Section 20111.5, only those sealed bids received from bidders who have been prequalified for at least one day prior to bid opening shall be opened and publicly read aloud.

3. Bid Security.

Each bid shall be accompanied by a bid security in cash, a certified or cashier's check, or bid bond in an amount not less than 10 percent of the total bid price payable to the Owner. The bid security shall be given as a guarantee that if awarded the contract the bidder will execute and return the Construction Agreement within 10 working days after award of the contract and will furnish or, the prescribed forms a satisfactory Payment (labor and material) Bond and separate Performance Bond, in accordance with the Contract Documents and Civil Code Section 3248, and certificates evidencing that the required insurance is in effect in the amounts set forth in the Contract Documents. In case of refusal or failure to timely execute the Construction Agreement and furnish the required bonds and insurance certificates, the bid security shall be forfeited to the Owner. If the bidder elects to furnish a bid bond as its bid security, the bidder shall use the bid bond form included in the Contract Documents, unless the Owner elects to waive the use of the form provided, in its sole discretion.

4. Signature.

At the various times such documents are required to be submitted, the Bid Form, all bonds, the Designation of Subcontractors form, all Information Required of Bidder or prequalification forms, Workers Compensation Certificate, Drug-Free Workplace Certification, Non-Collusion Affidavit, the Construction Agreement, and all Guarantees must be signed in the name of the bidder and must bear the signature of the person or persons duly authorized to sign these documents. Where indicated, if bidder is a corporation, the legal name of the corporation shall first be set forth, together with two signatures: one from among the chairman of the board, president, or vice president, and one from among the secretary, chief financial officer, or assistant treasurer. Alternatively, the signature of other authorized officers or agents may be affixed, if duly authorized by the corporation. Such documents shall include the title of such signatories below the signature and shall bear the corporate seal. Where indicated, if bidder is a joint venture or partnership, the bidder shall submit with the bid certifications signed by authorized officers of each of the parties to the joint venture or partnership, naming the individual (1) who shall be the agent of the joint venture or partnership, (2) who shall sign all necessary documents for the joint venture or partnership and, (3) should the joint venture or partnership be the successful bidder, who shall act in all matters relative to the resulting contract for the joint venture or partnership. If bidder is an individual, his/her signature shall be placed on such documents.

5. Modifications.

Changes in or additions to any of the bid documents, the summary of the work bid upon, or the alternative proposals, or any other modifications which are not specifically called for by the Owner, may result in the Owner's rejection of the bid as not being responsive. No oral or telephonic modification of any bid will be considered. However, prior to the opening of bids, a telegraphic modification signed by the bidder and postmarked and received prior to the opening of bids, or a facsimile modification duly signed by the bidder received prior to

the opening of bids, may be considered if included within a sealed bid.

6. Erasures, Inconsistent, or Illegible Bids.

The bid submitted must not contain any erasures, interlineations, or other corrections unless each correction creates no inconsistency and is suitably authenticated and noted by signature of the bidder. In the event of inconsistency between words and figures in the bid, words shall control figures. In the event the Owner determines that any bid is unintelligible, illegible, or ambiguous, the Owner may reject the bid as not being responsive.

7. Examination of Site and Contract Documents.

At its own expense and prior to submitting bids, each bidder shall examine all documents relating to the project, visit the site, and determine the local conditions which may in any way affect the performance of the work, including the general prevailing rate of per diem wages and other relevant cost factors. Each bidder shall be familiar with all federal, state, and local laws, ordinances, rules, regulations, and codes affecting the performance of the work, including the cost of permits and licenses required for the work. Each bidder shall make such surveys and investigations, including investigation of subsurface or latent physical conditions at the site or where work is to be performed, as it may deem necessary for performance of the work at the price being bid. Each bidder shall determine the character, quality, and quantities of the work to be performed and the materials and equipment to be provided, and shall correlate its observations, investigations, and determinations with all requirements of the project.

The Contract Documents show and describe the existing conditions as they are believed to have been used in the design of the work and are only provided as information for the bidder. **The Owner is not making any warranties regarding this information. The Owner shall not be liable for any loss sustained by the successful bidder resulting from any variance between the conditions and design data given in the Contract Documents and the actual conditions revealed during the bidder's pre-bid examination or during the progress of the work.** Bidder agrees that the submission of a bid shall be incontrovertible evidence that the bidder has complied with and agrees to further comply with all the requirements of this section.

8. Withdrawal of Bids.

Any bid may be withdrawn, either personally, by written request, or by telegraphic or facsimile request confirmed in the manner specified above for bid modifications, at any time prior to the scheduled closing time for receipt of bids. In accordance with this paragraph, the bid security shall be returned for bids withdrawn prior to the scheduled closing time for receipt of bids. No bidder may withdraw any bid for a period of 60 days after the award of the contract. A bidder's unawarded alternative bids remain open for a period of six months after award of contract as irrevocable offers to enter into either change orders or separate contracts for the stated price adjustment.

9. Agreement and Bonds.

The Construction Agreement and the form of the Payment and Performance Bonds which the successful bidder as Contractor will be required to execute are included in the Contract Documents and should be carefully examined by the bidder. The Payment Bond shall be in an amount not less than 100 percent of the amount of the contract in accordance with Civil Code Section 3248. The successful bidder as Contractor will also be required to furnish a separate Performance Bond in the amount of 100 percent of the contract amount. Sufficient bonds shall be fully executed and returned to Owner with the executed Construction Agreement.

10. Interpretation of Contract Documents.

If any bidder is in doubt as to the true meaning of any part of the Contract Documents, or finds discrepancies in or omissions from the drawings and specifications, a written request for an interpretation or correction shall be submitted to the Owner. The bidder submitting the written request shall be responsible for its prompt delivery. Any interpretation or correction of the Contract Documents will be made only by addendum issued by the Owner, and a copy of any addendum will be hand-delivered, mailed, or faxed to each bidder known to have received a set of the Contract Documents. No person is authorized to make any oral interpretation of any provision in the Contract Documents, nor shall any oral interpretation be binding on the Owner. If there are discrepancies on drawings, plans, or specifications, or conflicts between drawings, plans, specifications, terms, or conditions, the interpretation of the Owner shall prevail. Bidder shall become familiar with the plans, specifications, and drawings.

SUBMISSION OF A BID WITHOUT REQUESTING CLARIFICATIONS SHALL BE INCONTROVERTIBLE EVIDENCE THAT THE BIDDER HAS DETERMINED THAT THE PLANS, SPECIFICATIONS, AND DRAWINGS ARE SUFFICIENT FOR BIDDING AND COMPLETING THE WORK, THAT BIDDER IS CAPABLE OF READING, FOLLOWING AND COMPLETING THE WORK IN ACCORDANCE WITH THE PLANS, SPECIFICATIONS, AND DRAWINGS, AND THAT THE PLANS, SPECIFICATIONS, AND DRAWINGS FALL WITHIN AN ACCEPTABLE STANDARD FOR THESE ITEMS, AND THAT BIDDER AGREES THAT THE PROJECT CAN AND WILL BE COMPLETED ACCORDING TO THE OWNER'S TIME LINES AND ACCORDING TO THE PROGRESS SCHEDULE TO BE SUBMITTED BY THE SUCCESSFUL BIDDER INCORPORATING THE OWNER'S TIME LINES FOR COMPLETION OF THE PROJECT.

11. Bidders Interested in More Than One Bid.

No person, firm, or corporation shall be allowed to make or file or be interested in more than one bid for the same work unless alternate bids are specifically called for by the Owner. A person, firm, or corporation that has submitted a sub-proposal to a bidder, or that has quoted prices of materials to a bidder, is not disqualified from submitting a proposal or quoting prices to other bidders or submitting a bid on the project.

12. Award of Contract.

(a) The Owner reserves the right to reject any or all bids, or to waive any irregularities or informalities in any bids or in the bidding process, and to award more than one contract. If two identical low bids are received from responsive and responsible bidders, the Owner will determine which bid will be accepted pursuant to Public Contract Code Section 20117.

(b) If made by the Owner, award of the contract will be by action of the governing board or other governing body to the lowest responsive and responsible bidder. In the event an award of the contract is made to a bidder and that bidder fails or refuses to execute the Agreement and provide the required documents within the time required, the Owner may award the contract to the next lowest responsive and responsible bidder or release all bidders. An election by the Owner to reject all bids does not release the bid security of any bidder who has previously been awarded the contract and failed or refused to execute the Agreement and provide the required documents.

(c) In ascertaining the low bidder, the bids will be examined without reference to any substitutions requested by any bidder, whether or not the substitution request would result in a modification of the contract price.

13. Alternatives.

If alternate bids are called for, the contract will be awarded to the lowest responsive and responsible bidder on the basis indicated in the Notice to Contractors Calling for Bids. Owner reserves the right to award or reject any, all, or any combination of the alternates called for in the bid documents, whether or not the alternate(s) was included in the calculations used to identify the low bidder. All bid alternates not part of the contract initially awarded by Owner shall remain open and valid for a period of six months after the contract is awarded as irrevocable offers to enter into either change orders or separate contracts on the items for the price adjustment contained in the bid alternate.

14. Public Contract Code Section 20111.15—Prequalification of Bidders.

X Prequalification is not required to bid on this project. Bidders must complete and submit with their bids the Contractor's Qualifications Questionnaire that is included in the bid documents provided by Owner.

 Prequalification is required to bid on this project. Prospective bidders are required to submit to the Owner a completed prequalification questionnaire and financial statement, on forms provided by the Owner, no later than five days prior to the date fixed for the public opening of sealed bids. These documents will be the basis for determining which bidders are qualified to bid the project. Bidders will be notified by

telephone and mail of their prequalification status within four days after submission of prequalification documents. Bids will not be accepted from any bidder who has not been prequalified at least one day prior to the bid opening. Pursuant to Public Contract Code Section 20111.5, the information in the prequalification questionnaire and financial statement will be kept confidential. Prequalification documents may be obtained by contacting the Owner.

15. Competency of Bidders.

In selecting the lowest responsive and responsible bidder, consideration will be given not only to the financial standing but also to the general competency of the bidder for performance of the work. By submitting a bid, each bidder agrees that in determining the successful bidder and its eligibility for the award, the Owner may consider the bidder's experience, facilities, conduct, and performance under other contracts, financial condition, reputation in the industry, and other factors relating to or which could affect the bidder's performance of the project. To this end, where bidders are not required to prequalify, each bid shall be supported by a statement of the bidder's experience on the form entitled "Contractor's Qualifications Questionnaire" included in the bid package provided by the Owner.

The Owner may also consider the qualifications and experience of subcontractors and other persons and organizations (including those who are to furnish the principal items of material and equipment) proposed for those portions of the work. Operating costs, maintenance considerations, performance data, and guarantees of materials and equipment may also be considered by the Owner. In this regard, the Owner may conduct such investigations as the Owner deems necessary to assist in the evaluation of any bid and to establish the responsibility, qualifications, and financial ability of the bidder, proposed subcontractors, and other persons and organizations to do the work to the Owner's satisfaction within the prescribed time. The Owner reserves the right to reject the bid of any bidder who does not pass any such evaluation to the satisfaction of the Owner, or in the Owner's sole discretion, to permit substitution of subcontractor(s) found non-responsible.

16. Listing Subcontractors.

Each bidder shall submit a list of the proposed subcontractors on the project as required by the Subletting and Subcontracting Fair Practices Act (Public Contract Code Section 4100 and following sections) on the form furnished with the Contract Documents. If alternate bids are called for and the bidder intends to use different or additional subcontractors, a separate list of subcontractors must be submitted for each such alternate bid. The Owner may request that bidder submit information to assess the responsibility of the bidder's proposed subcontractors. The apparent low bidder shall, within 24 hours of the bid opening, provide a complete listing of all subcontractors, including full name, address, telephone numbers and contractor's license number and type.

17. Workers' Compensation.

In accordance with the provisions of Labor Code Section 3700, the successful bidder shall secure the payment of compensation to all employees. The successful bidder awarded the contract shall sign and file with the Owner, at the time of returning the executed Construction Agreement, the certificate which is included as a part of the Contract Documents.

18. Contractor's License.

At the bid opening date and time, if a bidder is not properly licensed to perform the project in accordance with Division 3, Chapter 9, of the California Business and Professions Code and the Notice Calling for Bids as required, that bidder's bid will be rejected as nonresponsive.

Business and Professions Code Section 7028.15 precludes payment for work or materials unless the Registrar of Contractors verifies to the Owner that the bidder was properly licensed at the time the bid was submitted. If this project is federally funded, the bidder must be properly licensed prior to the award of the contract. Any bidder not properly licensed is subject to penalties under the law and the contract will be considered void. If the license classification specified in these Contract Documents is that of a "specialty contractor" as defined in Business and Professions Code Section 7058, the specialty contractor awarded the contract for this work shall construct a majority of the work in accordance with the provisions of Business and Professions Code Section 7059.

19. Anti-Discrimination.

It is the policy of the Owner that in all work performed under contracts there be no unlawful discrimination against any prospective or active employee engaged in the work because of race, color, ancestry, national origin, religious creed, sex, age, marital status, physical disability, mental disability, or medical condition. The successful bidder agrees to comply with applicable federal and state laws, including but not limited to the California Fair Employment and Housing Act, beginning with Government Code Section 12900 and Labor Code Section 1735. In addition, the successful bidder agrees to require like compliance by any subcontractors employed on the work by that bidder.

20. Hold Harmless.

The successful bidder awarded the contract shall hold harmless and indemnify various parties as more clearly set forth elsewhere in the Contract Documents.

21. Substitutions.

- (a) All bids should be calculated and submitted on the project as described in the bid documents, and on the assumption that substitution requests submitted with the

bid will not be approved. Notwithstanding the foregoing, substitution requests submitted with bids will be given due consideration and adjustments to the contract, which may include adjustment to contract price, will be contained in a change order should the request be approved. Bidders not desiring to bid without prior approval of a proposed substitution should follow the procedure contained in this section for pre-bid review of proposed substitutions.

(b) Should the bidder wish to request prior to bid opening any substitution for the specified materials, process, service, or equipment, the bidder shall submit a written request at least 10 working days before the bid opening date and time. If the requested substitution is acceptable, the Owner will approve it in an addendum issued to all bidders of record. Requests received less than 10 working days prior to bid opening will not be considered prior to the bid date. Extensions of the bid date shall not operate to extend the deadline for requesting substitutions unless the Owner so states in an addendum issued to all bidders of record.

(c) If a substitution is not requested and considered prior to the bid date, the bidder shall submit with the bid all proposed substitutions, if any, on the Substitution Listing form contained in the bid documents.

(d) With respect to any materials, process, service, or equipment listed in the bid, unless the bidder clearly indicates in its Substitution Listing that it is proposing to use an "equal" material, process, service, or equipment, its bid shall be considered as offering the specified material, process, service, or equipment referred to by the brand name or trade name specified.

(e) Unless expressly authorized in the bid documents, no bid may be conditioned on the Owner's acceptance of a proposed substitution. Any bid containing any such condition may be treated as a non-responsive bid.

(f) It is expressly understood and agreed that the Owner reserves the right to reject any proposed substitution. It is further expressly understood and agreed that in the event the Owner rejects a proposed "equal" item, or any other requested substitution, the specified material, process, service, or equipment designated by brand name or trade name, or other item as specified, will be provided.

(g) No substitution request of any kind or nature may be made after the bid date, except by the express written permission of the Owner and on such terms as Owner may require, or in an emergency, as in the case where a specified material, process, service, equipment, or other item has become unavailable through no fault of the bidder.

(h) These time limitations shall be complied with strictly, and in no case will an extension of time for completion be granted because of the failure to request the substitution of an item at the times and in the manner set forth herein.

(i) Prior to contract award, the Owner shall notify the bidder of the Owner's decision concerning proposed substitutions of "equal" items submitted with the bid. The Owner shall notify bidder of the Owner's decision on any other proposed substitutions as those decisions are made. Notification of all decisions by the Owner shall be in writing, and no proposed substitution shall be deemed approved unless the Owner has confirmed it in writing.

(j) With respect to all proposed substitutions, the requirements applicable to the Contractor in the Contract Documents shall be applicable to all bidders requesting substitutions.

22. Surety Qualifications.

Bid bonds executed by a surety insurer admitted in the State of California for purposes of issuance of such bonds will be accepted by Owner as sufficient. Payment and/or performance bonds executed by a surety insurer admitted in the State of California with a minimum "A minus, VIII" rating (A minus V" when the price stated in the Contract Documents is less than \$500,000) as rated by the current edition of Best's Key Rating Guide published by A.M. Best Company, Oldwick, New Jersey 08858, shall be presumed by Owner to be sufficient for the issuance of such bonds. In the alternative, any admitted surety company which satisfies the requirements set forth in Code of Civil Procedure Section 995.660 shall be accepted and approved for the issuance of bonds, and documents demonstrating satisfaction of the requirements of Section 995.660 with respect to the bid bond must be submitted with the bid. No personal sureties will be accepted.

23. Liquidated Damages.

All work must be completed within the time limits set forth in the Contract Documents. Bidders must understand that the goodwill, educational process, and other business of the Owner will be damaged if the project is not completed within the time limits required. Should the work not be completed within the specified time for completion, the successful bidder awarded the contract may be liable for liquidated damages and for expenses incurred by the

Owner for failure to timely complete the project. Such damages shall be deducted from any payments due or to become due to the successful bidder.

SUBMISSION OF A BID ON THIS PROJECT SHALL BE TAKEN AS CONCLUSIVE AND IRREFUTABLE EVIDENCE THAT BIDDER AGREES WITH THE REQUIREMENTS OF THIS SECTION.

24. Drug-Free Workplace Certification.

Pursuant to Government Code Section 8350 and following sections, the successful bidder will be required to execute and return to Owner the Drug-Free Workplace Certificate

contained in the Contract Documents with the executed Construction Agreement. The bidder will be required to take positive measures outlined in the certificate to ensure the presence of a drug-free workplace. Failure to abide with the conditions set forth in the Drug-Free Workplace Act could result in penalties, including termination of the Construction Agreement or suspension of payment under the Construction Agreement.

25. Non-Collusion Affidavit.

In accordance with the provisions of Public Contract Code Section 7106, each bid must be accompanied by a properly notarized Non-Collusion Affidavit.

26. Implementation of Disabled Veteran Business Enterprises Requirements.

In accordance with Education Code Section 17076.11, the Owner has a participation goal for disabled veteran business enterprises of at least three percent per year of the overall dollar amount of funds allocated to the Owner by the State Allocation Board pursuant to the Leroy F. Greene School Facilities Act of 1998 for construction or modernization and expended each year by the Owner. Prior to and as a condition precedent for final payment under any contract for this project, the successful bidder will be required to provide appropriate documentation to the Owner identifying the amount paid to disabled veteran business enterprises in conjunction with the contract, so the Owner can assess its success at meeting this goal.

27. Asbestos and Lead-Based Paint Certification.

The form of Contractor's Certificate Regarding Non-Asbestos Containing Materials and Exclusion of Lead Products, as contained in the Contract Documents, shall be executed and submitted with the bid.

28. Fingerprinting Requirements.

The successful bidder and all subcontractors at any level will be required to comply with any applicable laws on fingerprinting construction workers. Minimum requirements are set forth in the Contract Documents, and the form for certification of compliance is contained in the Contract Documents. The successful bidder must complete and return this form when directed by Owner.

29. California Products.

Price, fitness, and quality being equal with regard to supplies, the Owner may prefer supplies grown, manufactured, or produced in California. The Owner may next prefer supplies partially grown, manufactured, or produced in California. Where the Owner has a preference, the bids of the suppliers or the prices quoted by them (i) must not exceed by more than five percent the lowest bids/prices quoted by out-of-state suppliers, (ii) the major portion of the manufacture of the supplies is not done outside of California, and (iii) the

public good will be served. Refer to specifications for indications of Owner preferences. Government Code Sections 4330-4334.

30. License Required.

To perform the work required for this project, Bidder must possess the type of contractor's license specified in the Notice to Contractors Calling for Bids.

31. Post-Bid Credits.

Should any bidder or proposed subcontractor to any bidder issue any credit or otherwise reduce its bid or quote pertaining to the work of this project, the value of the credit or other reduction shall be passed on to the Owner less only the applicable markups for profit and overhead as specified in the Contract Documents on change orders.

32. Contents of Bid.

The bid will include the following documents: Bid Form, List of Subcontractors, Substitution Listing form, Non-collusion Affidavit, Exclusion of Asbestos Products Affidavit, Exclusion of Lead Products Affidavit, Contractors' Qualification Questionnaire (not required if a prequalification process is specified), Bid Bond or other bid security, and Certification of Attendance at Mandatory Job Walk, if a job walk is required on this project.

33. Bid Protests.

Any bidder having submitted a bid on the project may file a protest against the proposed contract award or challenging the validity of other bids. The protest must meet all of the following requirements:

- (a) The protest shall be submitted in writing and shall contain all the materials required by these provisions; one that does not contain all the required material shall not be recognized.
- (b) The protest shall be received by the Owner no later than close of business on the second business day after bid opening; one received after that time shall not be recognized.
- (c) Each protest shall contain the following:
 - (i) Identification by name, address, and telephone number of the protesting person(s), company and/or organization and identification of the project to which the protest pertains.
 - (ii) The protest shall set forth in detail all grounds for the protest, including without limitation all facts, identification by name of any other bids or bidders

involved in the protest, all supporting documentation, together with any legal authorities and/or argument in support of the grounds for the protest. Any matters not set forth in the written protest shall be deemed waived. All factual contentions must be supported by competent, admissible, and credible evidence.

(d) Any protest not conforming to the requirements of this section shall be rejected as invalid.

(e) Where a protest is filed in conformity with this section, the Owner's staff or such individual(s) as may be designated by the Owner, shall review and evaluate the basis of the protest and provide a written decision to the protesting bidder. The written decision shall either concur with or deny the protest.

(f) Submission of a written protest to and receipt of a written decision from the Owner staff shall be considered an administrative remedy, and failure to follow this procedure shall be a bar to any legal action.

(g) The written decision by the Owner's staff may be appealed to the Owner. The appeal must be filed with the Owner's governing board or other governing body within two business days of the protesting bidder's receipt of the written decision of the Owner's staff.

(h) The appeal must clearly state the reasons and basis for appealing the decision of the Owner's staff, making specific reference to any portions of the material submitted with the protest required.

(i) A hearing on the appeal shall be held before the Owner's governing board or other governing body within 45 days or less of receipt of the appeal.

(j) The Owner's governing board or other governing body will make a decision within seven days following the hearing. The decision of the Owner's governing board or other governing body is not subject to arbitration, mediation, reconsideration, or further appeal.

(k) Submission of an appeal to and receipt of a decision from the Owner's governing board or other governing body shall be considered an administrative remedy, and failure to follow this procedure shall be a bar to any legal action.

34. Procedure for Protesting Being Deemed A Non-Responsible Bidder.

Any bidder or prospective bidder deemed non-responsible after having submitted a bid may file an appeal of the action to the Owner's governing board or other governing body. The protest must meet all of the following requirements:

- (a) The appeal shall be submitted in writing, and shall contain all the materials required by these provisions; one that does not contain all the required material shall not be recognized.
- (b) The appeal must be received by the Owner's governing board or other governing body within two business days of the action by Owner giving rise to the protest; one received after that time shall not be recognized.
- (c) A hearing on the appeal shall be held before the Owner's governing board or other governing body prior to the award of contract.
- (d) The decision of the Owner's governing board or other governing body is not subject to arbitration, mediation, reconsideration, or further appeal.
- (e) Submission of a protest to and receipt of a decision from the Owner's governing board or other governing body shall be considered an administrative remedy, and failure to follow this procedure shall be a bar to any legal action.

35. Projects Subject to a Labor Compliance Program.

If the project is subject to a Labor Compliance Program as indicated in the Notice Calling for Bids, the law requires that the Owner's Labor Compliance Program include but not be limited to the following:

- (a) All bid invitations and public works contracts shall contain appropriate language concerning the requirements of Chapter 1 of Part 7 of Division 2 of the California Labor Code, beginning with Section 1720.
- (b) A pre-job conference shall be conducted with the contractor and subcontractors to discuss federal and state labor law requirements applicable to the contract.
- (c) Project contractors and subcontractors shall maintain and furnish at a designated time a certified copy of each weekly payroll containing a statement of compliance signed under penalty of perjury.
- (d) The Owner shall review, and if appropriate audit, payroll records to verify compliance with this chapter.
- (e) The Owner shall withhold contract payments when payroll records are delinquent or inadequate.
- (f) The Owner shall withhold contract payments equal to an amount of underpayment and applicable penalties when, after investigation, it is established that

underpayment has occurred.

Bidders wishing to review the specific elements of the Owner's labor compliance program can obtain a copy of the labor compliance program document at Owner's administrative offices.

03-BID FORM

Name of Bidder: _____

PROJECT TITLE: Kitchen Addition at Mt. Vernon Elementary School

PROJECT NO: 3990

To: Bakersfield City School District referred to as "OWNER."

A. In compliance with your Notice to Contractors Calling for Bids and related documents, the undersigned bidder, having familiarized itself with the terms of the contract, the local conditions affecting the performance of the contract, the cost of the work at the place where the work is to be done, and the drawings and specifications and other contract documents, proposes and agrees to perform the contract within the time stipulated, including all of its component parts and everything required to be performed, and to provide and furnish any and all of the labor, materials, tools, expendable equipment, and all applicable taxes, utility, and transportation services necessary to perform the contract and complete in a workmanlike manner all of the work required in connection with the above referenced project, including sheeting, shoring, and bracing, or equivalent method for protection of life and limb in trenches and open excavation in conformance with applicable safety orders, within the time limits set for completion of all work, all in strict conformity with the drawings and specifications and other contract documents, including Addenda Nos. _____ on file at the office of OWNER for the Base Bid sum of:

[list all]

_____ dollars.
[written in words]

\$ _____.
[written in numbers]

B. NOT USED

C. The Bidder agrees that upon written notice of acceptance of this bid, he will execute the contract and provide all bonds and other required documents within 10 working days after contract award.

D. Attached is bid security not less than 10 percent of the bid, in the amount of \$ _____, in the form of (cash) (bid bond) (certified check) (cashier's check).
[circle one]

E. The Bidder acknowledges that OWNER reserves the right to accept or reject any and/or all Base Bids and alternate bids. This entire bid shall remain open and active for 60 days after bid opening, and any alternate bids not initially awarded shall remain active, as an irrevocable offer by the Bidder to enter into either a change order or separate contract, for up to six months after award of the contract.

F. It is understood and agreed that if written notice of the acceptance of this bid is mailed, telegraphed, or delivered to the Bidder after the opening of the bid, and within the time this bid is required to remain open, or at any time after that before this bid is withdrawn, the Bidder will execute and deliver to OWNER the Agreement and will also furnish and deliver to OWNER the Performance Bond and a separate Payment Bond as specified, certificates of insurance, and other required documents.

G. It is understood and agreed that should the Bidder fail or refuse to return executed copies of the Construction Agreement, bonds, insurance certificates, and other required documents to OWNER within the time specified, the bid security shall be forfeited to OWNER.

H. In submitting this bid, the Bidder offers and agrees that if the bid is accepted it will assign to OWNER all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act (Business & Professions Code Section 16700 and following sections) arising from purchases of goods, materials, or services by the Bidder for sale to OWNER pursuant to the bid. Such assignment shall be made and become effective at the time OWNER tenders final payment under the contract. (Public Contract Code Section 7103.5; Government Code Section 4552.)

I. The Bidder hereby certifies that it is, and at all times during the performance of work under the Contract Documents shall be, in full compliance with the provisions of the Immigration Reform and Control Act of 1986 ("IRCA") in the hiring of its employees, and the Bidder shall indemnify, hold harmless, and defend OWNER against any and all actions, proceedings, penalties, or claims arising out of the Bidder's failure to comply strictly with the IRCA.

J. The Bidder understands that a licensed contractor shall not submit a bid to a public agency unless the Bidder's contractor's license number appears clearly on the bid, the license expiration date is stated, and the bid contains a statement that the representations made therein are made under penalty of perjury. Any bid not containing this information, or a bid containing information which is subsequently proven false, may be considered non-responsive and may be rejected by the public agency.

K. Bidder's contractor's license is: _____
[number] [class] [expires]

L. The undersigned hereby declares that all of the representations of this bid, including all documents comprising the bid package, are true and are made under penalty of the perjury laws of the State of California.

INDIVIDUAL/DBA

Signature: _____

Print Name: _____

Business Address: _____

Date: _____ Telephone: _____

PARTNERSHIP

Partnership Name: _____

Signed by: _____, Partner

Print Name: _____

Business Address: _____

Date: _____ Telephone: _____

Names of Other Partners _____

CORPORATION

Corporation Name: _____,

a _____ Corporation.

(State of Incorporation)

Business Address: _____

Date: _____ Telephone: _____

By: _____ [Required] [Seal]

(President/Chief Executive Officer/Vice President) [Circle One]

Print Name: _____

By: _____ [Required]

(Secretary/Treasurer/Chief Financial Officer/Assistant Treasurer) [Circle One]

Print Name: _____

JOINT VENTURE

Joint Venturer Name: _____

Signed by: _____ (Joint Venturer)

Print Name: _____

Business Address: _____

Date: _____ Telephone: _____

Other Parties to Joint Venture:

If an individual joint venturer: _____ (Signature)

Print Name: _____

If a DBA joint venturer: By: _____ (Signature)

Print Name: _____

If a partnership joint venturer: By: _____

(Name)

Signed by: _____, Partner

(Signature)

Print Name: _____

If a Corporation joint venturer:

[Seal]

(Name)

a _____ Corporation.

(State of Incorporation)

Signed By: _____

Print Name: _____

Title: _____

04-SUBSTITUTION LISTING

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

TO: Bakersfield City School District (“OWNER”)

1. Pursuant to bidding and contract requirements for the work titled:

PROJECT TITLE: Kitchen Addition at Mt. Vernon Elementary School

The contract sum, proposed by the undersigned on the Bid Form, is for the work as shown on the drawings, described in the specifications, and otherwise defined in the Contract Documents. However, the undersigned proposes the following substitutions for the Owner’s consideration. Should the Owner accept any or all of the proposed substitutions, the Bidder agrees to reduce the contract sum by the amount shown. Proposed substitutions must be submitted not later than 10 working days prior to the date of bid opening in order for such request to be reviewed before bidding. All substitutions must be listed on this form and submitted prior to or with the bid or they will not be reviewed.

2. Please complete, attaching additional sheets as necessary:

Bidder proposes [check one]: no substitutions.
 the following substitutions:

Specified Product or Material	Drawing Number or Specification Section	Proposed Substitution	Proposed Price Reduction

3. All bids should be calculated and submitted on the assumption that substitution requests will not be approved.

4. Bidder hereby certifies that the requested substitutions are equal or better in all respects to what is specified, unless otherwise noted.

**SIGNATURE MUST BE IDENTICAL
TO THAT PROVIDED ON BID FORM**

BIDDER: _____

BY: _____

05-LIST OF SUBCONTRACTORS

TO BE SUBMITTED WITH BID

PROJECT TITLE: Kitchen Addition at Mt. Vernon Elementary School

OWNER: Bakersfield City School District

A. In compliance with the Subletting and Subcontracting Fair Practices Act (Public Contract Code Section 4100 and following sections) and any amendments to the Act, each Bidder shall set forth below:

1. The name and location of the place of business of:
 - a. Each subcontractor who will perform work or labor or render service to the Bidder in or about the construction of the work or improvement to be performed under the Construction Agreement;
 - b. Each subcontractor licensed by the State of California who, under subcontract to the Bidder, specially fabricates and/or installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in an amount in excess of one-half of one percent of the Bidder's total bid;
2. The portion of the work which will be done by each subcontractor.

B. The Bidder shall list only one subcontractor for each such portion as is defined by the Bidder in this bid.

C. If the Bidder fails to specify a subcontractor, or if the Bidder specifies more than one subcontractor for the same portion of work to be performed under the contract in excess of one-half of one percent of the Bidder's total bid, the Bidder shall be deemed to have agreed that the Bidder is fully qualified to perform that portion, and that the Bidder alone shall perform that portion.

D. No Bidder whose bid is accepted shall (i) substitute any subcontractor, (ii) permit any subcontractor to be voluntarily assigned or transferred, or allow it to be performed by anyone other than the original subcontractor listed in the original bid, or (c) sublet or subcontract any portion of the work in excess of one-half of one percent of the Bidder's total bid as to which the original bid did not designate a subcontractor, except as authorized in the Subletting and Subcontracting Fair Practices Act.

E. Violations of any provision of the Subletting and Subcontracting Fair Practices Act may be deemed by the OWNER to make the bid non-responsive and/or the Bidder non-responsible.

F. Attach additional sheets, as necessary.

**SUBCONTRACTOR'S NAME & STREET ADDRESS
(CITY, STATE, ZIP)**

**DESCRIPTION OF
PORTION OF WORK TO
BE SUBCONTRACTED**

Firm Name: _____

By: _____

Signed: _____
[Signature must match that on bid]

06-BID BOND

IF USED BY BIDDER, MUST BE COMPLETED AND SUBMITTED WITH BID

PROJECT TITLE: Kitchen Addition at Mt. Vernon Elementary School

OWNER: Bakersfield City School District

KNOW ALL MEN BY THESE PRESENTS, that we, _____
as Principal, and _____ as
Surety, are held and firmly bound unto the _____
(referred to as Owner) in the sum of _____ percent of the total amount of the bid of the
Principal submitted to the Owner for the work and obligations described below for the
payment of which sum in lawful money of the United States, well and truly to be made, we
jointly and severally bind ourselves, our heirs, executors, administrators, successors, and
assigns.

The condition of this obligation is such that whereas the Principal has submitted the
accompanying bid dated _____, 20____, for:

NOW, THEREFORE, if the Principal shall not withdraw said bid within the period specified
therein after the opening of the same, or if no period be specified, within 60 days after said
opening; and if the Principal is awarded the contract, and shall within the specified period,
or if no period is specified, within five working days after the award of the contract, enter
into a written contract with the Owner in accordance with the bid as accepted and give
bonds with good and sufficient surety or sureties as may be required for the faithful
performance and proper fulfillment of such contract and for the payment of labor and
materials used for the performance of the contract, provide certificates evidencing the
required insurance is in effect (in the amounts required in the contract documents), and
provide any other documents required under the contract documents to be submitted at the
time the contract is executed, then the above obligation shall be void and of no effect,
otherwise to remain in full force and effect.

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

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

IN WITNESS WHEREOF, the parties have executed this instrument under their several seals this _____ day of _____, 20____, the name and corporate party being hereto affixed and duly signed by its undersigned authorized representative.

DATED: _____

PRINCIPAL

By _____

Title _____

DATED: _____

SURETY

By _____

Title _____

Note: Signatures of those executing for the Surety must be properly acknowledged.

07-NON-COLLUSION AFFIDAVIT

PROJECT TITLE: Kitchen Addition at Mt. Vernon Elementary School

OWNER: Bakersfield City School District

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

State of California)
) ss.
County of _____)

_____, being duly sworn, deposes and says:

That he or she is the _____(position) of _____
(name of bidder), the party making the bid; that the bid is not made in the interest of, or on behalf of any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract or anyone interested in the proposed contract; that all statements contained in the bid are true; and further that the bidder has not, directly or indirectly, submitted his or her bid price or any price breakdown, or their contents, or divulged relative information or data, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent of any of these, to effectuate a collusive or sham bid.

Contractor _____

By _____

Signed _____
[Signature must match that on bid]

Subscribed and sworn to before me on _____, 20__.

SEAL

Notary Public

08-EXCLUSION OF ASBESTOS PRODUCTS

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

PROJECT TITLE: Kitchen Addition at Mt. Vernon Elementary School

OWNER: Bakersfield City School District

The Contractor agrees that asbestos containing products or materials will not be used in performing work under the Agreement.

At completion of work under the Agreement, the CONTRACTOR will warrant and represent to the OWNER the following:

1. That no asbestos containing products or materials were used in performing work under the Agreement.
2. That should any asbestos containing products be found on the project, the CONTRACTOR will replace them, together with all related materials, at no cost to the OWNER.
3. That should the replacement require any interruption in the normal operation of the school, the CONTRACTOR will pay all costs necessarily incurred to keep the school functioning with the least possible disruption to its day-to-day operations.

Executed at _____, California, on _____, 20____.

Firm Name _____

By _____

Signed _____

[Signature must match that on bid]

09s-CONSTRUCTION AGREEMENT
[Small Projects]

THIS AGREEMENT is between the Bakersfield City School District
("OWNER") and _____
("CONTRACTOR"). OWNER and CONTRACTOR agree as follows:

1. Project. CONTRACTOR shall perform everything required to be performed and shall provide and furnish all labor, materials, tools, equipment, and all utility and transportation services required for the construction of

Mt. Vernon Elementary School
Kitchen Addition
2161 Potomac Avenue
Bakersfield, California 93307-2426

All work to be performed and materials to be furnished shall be in conformity with the complete Agreement which includes the following Contract Documents, all of which are incorporated by reference: Notice to Contractors Calling for Bids, Instructions to Bidders, Bid Form, Designation of Subcontractors, Workers' Compensation Certificate, Performance Bond, Non-collusion Affidavit, Insurance Certificates, Guarantees, any Payment Bond, Change Orders, Shop Drawing Transmittals, Contractor's Certificate Regarding Non-Asbestos and/or Lead Containing Materials, if any, Davis-Bacon Compliance Certification, if any, Fingerprinting Certification, Labor Compliance Program documents, if any, Special Conditions and/or Special Requirements, Plans, Drawings, and/or Specifications, this Agreement, and any modifications, addenda, and amendments of or to any of these documents. The Contract Documents are complementary, and what is called for by any one shall be as binding as if called for by all.

2. Time for Performance. CONTRACTOR shall commence work on the Project on the date stated in the OWNER's Notice to Proceed and shall complete the Project within ____ calendar days after that. Time is of the essence of this Agreement.

3. Contract Price. Subject to the terms and conditions of this Agreement, OWNER shall pay to CONTRACTOR for all work to be performed under this Agreement the total sum of \$ _____.

4. Payments.

A. Duration of Contract:

(1) Less Than 60 Days: CONTRACTOR shall be paid an amount equivalent to 90 percent of the contract price upon acceptance of the Project by the Governing Board or other governing body of OWNER. CONTRACTOR shall be paid the remaining 10 percent of the Contract Price within 35 days following the recording

of a Notice of Completion.

(2) Greater Than 60 Days: CONTRACTOR shall be paid a sum equal to 90 percent of the value of all work performed and of materials delivered and used, less the aggregate of previous payments. OWNER may also deduct from such payments any amounts deemed due from CONTRACTOR. These monthly payments shall be made only on the basis of estimates which shall be prepared by CONTRACTOR on a form approved by OWNER and filed before the fifth day of the month during which payment is to be made. Before consideration of a request for payment, a certificate in writing shall be obtained from the Architect stating that the work for which the payment is demanded has been performed in accordance with the terms of the Contract Documents and that the amount stated in the certificate is due under the terms of the Contract Documents. The certificate of the Architect shall not be conclusive upon OWNER, but advisory only. Work completed as estimated shall be an estimate only and no inaccuracy or error in said estimate shall operate to release CONTRACTOR or Surety from any damages arising from such work or from enforcing each and every provision of this Agreement, and OWNER shall have the right to subsequently correct any error made in any estimate for payment.

B. From the payments specified in Paragraph A, OWNER may make any deductions authorized or required by law or this Agreement including, by way of example only, the following:

- (1) Liquidated and other damages described in Paragraph 11;
- (2) Defective work not remedied.
- (3) Failure of CONTRACTOR to make proper payments to its subcontractor(s) or material men for materials or labor.
- (4) Damage to another contractor.
- (5) Other damages sustained by OWNER.

5. Submission of Bonds and Certificates. The CONTRACTOR shall not commence any work on the Project until it has submitted to OWNER all certificates and bonds required by this Agreement. All bonds and certificates shall be submitted to OWNER within ten days following award of this contract.

6. Insurance. CONTRACTOR shall take out and maintain at its own cost and expense during the term of this Agreement the following insurance:

A. Workers compensation insurance for all of CONTRACTOR's employees in amounts not less than that required by law. Pursuant to Labor Code Sections 3700 and 1860, et seq., CONTRACTOR shall submit to OWNER an acceptable Workers Compensation Certificate.

B. CONTRACTOR shall obtain and maintain in effect at its own cost and expense during the term of this Agreement public liability and property damage insurance with per occurrence limits of not less than One Million Dollars (\$1,000,000.00) for death or personal injury and One Million Dollars (\$1,000,000.00) for property damage. The policy(ies) shall contain an endorsement naming OWNER as an additional insured insofar as this Agreement is concerned, and provide that notice shall be given to OWNER at least 30 days prior to cancellation or material change in the form of such policy(ies). CONTRACTOR shall furnish OWNER with certificates for insurance containing the endorsements required under this section, and OWNER shall have the right to inspect the original policy(ies) of such insurance upon request.

C. All insurance companies must meet the following criteria:

- (1) U.S. Treasury listed
- (2) California admitted, as confirmed by the California Department of Insurance or listed in the California Department of Insurance's List of Eligible Surplus Line Insurers ("LESLI List")
- (3) A minimum rating of "A- VIII," as rated by the current edition of Best's Key Rating Guide, published by A.M. Best Company, Oldwick, New Jersey, 08858.

7. Performance/Payment Bonds. The CONTRACTOR shall furnish a Performance Bond in an amount equal to 100 percent of the Contract Price. If the Contract Price specified in Paragraph 3 is more than \$25,000, the CONTRACTOR shall also furnish a Payment Bond in an amount equal to 100 percent of the Contract Price. Any bond submitted must be issued by a California admitted corporate surety which is U.S. Treasury listed and whose U.S. Treasury listing indicates a bonding capacity in excess of the project cost. If a California admitted surety insurer issuing a bond does not meet these requirements, the insurer will be considered sufficient if each of the following conditions is satisfied:

A. The following documents are submitted with the bond:

- (1) The original, or a certified copy, of the unrevoked appointment, power of attorney, bylaws, or other instrument entitling or authorizing the person who executed the bond to do so.
- (2) A certified copy of the certificate of authority of the insurer issued by the Insurance Commissioner.
- (3) A certificate from the county clerk of the county in which the OWNER is located that the certificate of authority of the insurer has not been surrendered, revoked, canceled, annulled, or suspended, or in the event that it has, that renewed authority has been granted.

B. If it appears that the bond was duly executed, that the insurer is authorized to transact surety insurance in the state, and that its assets exceed its liabilities in an amount equal to or in excess of the amount of the bond subject to Insurance Code Section 12090.

8. Changes and Extra Work. CONTRACTOR and OWNER agree that changes in this Agreement or in the work to be done under this Agreement shall become effective only when written in the form of a Supplemental Contract or Change Order and approved and signed by OWNER and CONTRACTOR. Should OWNER direct or request additional project work not otherwise included within Paragraph 1 of this Contract, the cost of the additional work shall be added to the Contract Price and paid by OWNER pursuant to Paragraph 4 of Agreement. The term "cost" as used in this paragraph means the actual cost to CONTRACTOR of the labor, materials, or subcontracts required for the additional work increased by no more than 10 percent for CONTRACTOR overhead (including any increased bond costs).

9. Indemnification. CONTRACTOR shall indemnify and hold harmless OWNER, its governing board, officers, agents, and employees from every claim or demand made, and every liability, loss, damage, or expense, of any nature whatsoever, which may be incurred by reason of:

A. Any injury to or death of any person(s) or damage to, loss or theft of any property sustained by CONTRACTOR or any person, firm or corporation employed by CONTRACTOR, either directly or by independent contract, upon or in connection with the work called for in this Agreement, except for liability resulting from the sole active negligence, or willful misconduct of OWNER.

B. Any injury to or death of any person(s) or damage, loss or theft of any property caused by any act, neglect, default or omission of CONTRACTOR, or any person, firm, or corporation employed by CONTRACTOR, either directly or by independent contract, arising out of, or in any way connected with the work covered by this Agreement, whether said injury or damage occurs either on or off OWNER's property, if the liability arose due to the negligence or willful misconduct of anyone employed by CONTRACTOR, either directly or by independent contract.

At CONTRACTOR's own expense, cost, and risk, CONTRACTOR shall defend at the OWNER's request any and all actions, suits, or other proceedings that may be brought or instituted against OWNER, its governing board, officers, agents, or employees, on any such claim or liability, and shall pay or satisfy any judgment that may be rendered against OWNER, its governing board, officers, agents, or employees in any action, suit, or other proceeding as a result thereof.

10. Termination of Contract. Should CONTRACTOR commit any of the acts specified in this paragraph, by giving seven day's written notice to CONTRACTOR, OWNER may, without prejudice to any other rights or remedies afforded OWNER by law or by this Agreement, terminate the services of CONTRACTOR under this Agreement; take

possession of the Project and the premises on which it is located; take possession of all materials, tools, and appliances located on the premises; and complete the Project by whatever method OWNER may deem expedient. CONTRACTOR shall be deemed to have committed an act specified in this paragraph if CONTRACTOR:

- A. Is adjudged a bankrupt;
- B. Makes a general assignment for the benefit of creditors;
- C. Refuses or fails to supply enough properly skilled workers or proper materials to complete the Project in the time specified in this Agreement;
- D. Fails to make prompt payment to subcontractors, workers, or materialmen for labor performed on or materials furnished to the Project;
- E. Persistently disregards any laws or ordinances relating to the Project or its completion; or
- F. Otherwise commits a substantial violation of any provision of this Agreement.

11. Liquidated Damages.

A. Pursuant to Government Code Section 53069.85, for each calendar day completion is delayed beyond the time allowed in this Agreement, CONTRACTOR shall forfeit and pay to OWNER the sum of \$ 1,000.00 per calendar day which shall be deducted from any payments due to or to become due to CONTRACTOR. In addition to any liquidated damages which may be assessed, if CONTRACTOR fails to complete the Project within the time period provided in the Contract Documents, and if as a result OWNER finds it necessary to incur any costs and expenses (for example, relating to the acquisition and use of facilities pending completion of the Project), CONTRACTOR shall pay all those costs and expenses incurred by OWNER. These costs and expenses may include but are not limited to such items as rental payments, inspection fees, and additional architectural fees related to acquisition of facilities. These costs and expenses may be retained by OWNER from any payments otherwise due to CONTRACTOR.

B. Liquidated damages shall not be imposed because of any delays in completion of the project work due to (1) unforeseeable causes beyond the control and without the fault or negligence of CONTRACTOR and (2) performing any extra work pursuant to Paragraph 8 of this Agreement.

12. Clean-up. On completion of the Project, CONTRACTOR shall remove all debris and surplus materials from the project site.

13. Notices. Any and all notices or other matters required or permitted by this Agreement or by law to be served on, given to, or delivered to either OWNER or the CONTRACTOR by the other party to this Agreement shall be in writing and shall be deemed duly served, given, or delivered when personally delivered to the party to whom it is addressed or to a supervisory employee of that party, or in lieu of personal service,

when deposited in the United States Mail, first class postage paid, addressed to OWNER at _____, California, or to the CONTRACTOR at _____, California. Either party may change the party's address for these purposes by giving written notice of the change to the other party in the manner provided in this paragraph.

14. Assignment. This Agreement is for the personal services of CONTRACTOR in performing the work described in Section 1 of this Agreement and CONTRACTOR may not assign this Agreement, CONTRACTOR's right to monies becoming due under this Agreement, or CONTRACTOR's duties under this Agreement to any other person or entity without written consent of the OWNER.

15. Guarantee. CONTRACTOR guarantees all project work for a period of one year after the acceptance of the work by OWNER, and shall repair or replace any or all work, together with any other work which may be displaced in so doing, that may prove defective in workmanship and/or materials.

16. Wage Rates. Pursuant to the provisions of Article 2, commencing with Section 1770 of the Labor Code, OWNER has ascertained the general prevailing rate of per diem wages in the locality in which this public work is to be performed for each craft, classification, or type of worker needed to execute this Agreement. The general rates of per diem wages are available at OWNER's office. In the event that the listed or posted rates are in error, CONTRACTOR is responsible to pay those rates determined by the Director of Industrial Relations to be applicable, and OWNER shall not be responsible for any damages arising from the error.

It is the responsibility of CONTRACTOR to comply with the provisions of Labor Code Section 1776 dealing with the maintenance and inspection of employee payroll records.

If this project is subject to a Labor Compliance Program as indicated in the Notice to Contractors Calling for Bids, CONTRACTOR shall comply with all requirements of the Labor Compliance Program as indicated in the Contract Documents, in OWNER's labor compliance program document, and/or as required by the Department of Industrial Relations. CONTRACTOR shall permit OWNER or its designee to interview CONTRACTOR's employees concerning compliance with prevailing wage, apprenticeship, and related matters, whether or not during work hours, and shall require each subcontractor to provide OWNER with such access to its employees. The effective date of initial or final approval of the labor compliance program, the name of the agent or office administering the program and a telephone number for inquiries or assistance regarding the program are furnished in the Notice to Contractors Calling for Bids.

17. Apprentices. If applicable, CONTRACTOR shall comply with the requirements of Labor Code Section 1777.5 dealing with the employment of apprentices.

18. Hours. Pursuant to the provisions of Article 3, commencing at Section 1810 of the Labor Code, CONTRACTOR shall pay the required rate of overtime for all hours worked in excess of eight hours per day and 40 hours per week.

19. Laws and Regulations. CONTRACTOR shall give all notices and comply with all laws, ordinances, rules, and regulations relating to the work required by this Contract.

20. Permits/Licenses. All necessary permits and licenses shall be secured and paid for by CONTRACTOR.

21. Utilities. Unless otherwise agreed by the parties in writing, all utilities including but not limited to electricity, water, gas, and telephone used on the Project shall be furnished and paid for by CONTRACTOR.

22. Provisions Required by Law Deemed Inserted. Each and every provision of law and clause required by law to be inserted in this Agreement shall be deemed to be inserted and this Agreement shall be read and enforced as though it were included. If through mistake or otherwise, any provision is not inserted or is not correctly inserted, upon application of either party the Agreement shall be amended to make the insertion or correction. All references to statutes and regulations shall include all amendments, replacements, and enactments on the subject which are in effect as of the date of this Agreement, and any later changes which do not materially and substantially alter the positions of the parties.

23. Contractor's License. In order to perform the work required by this Agreement, CONTRACTOR must possess a valid, active license issued by the State of California, which shall remain valid and active throughout the Project. The license shall be of the type specified in the Notice to Contractors Calling for Bids.

24. Trenching or Other Excavations. If the Project involves digging trenches or other excavations that extend deeper than four feet, the following provisions shall be a part of this Contract:

A. CONTRACTOR shall promptly, and before the following conditions are disturbed, provide written notice to OWNER if CONTRACTOR finds any of the following conditions:

- (1) Material that CONTRACTOR believes may be a hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with the provisions of existing law.
- (2) Subsurface or latent physical conditions at the site which are different from those indicated or expected.
- (3) Unknown physical conditions at the site of any unusual nature or which are materially different from those ordinarily encountered and generally recognized as inherent in work which CONTRACTOR generally performs.

B. In the event that CONTRACTOR notifies OWNER that CONTRACTOR has found any of the conditions specified in subparagraphs (a), (b) or (c) above, OWNER shall

promptly investigate the condition(s). If OWNER finds that the conditions are materially different or that a hazardous waste is present at the site which will affect CONTRACTOR's cost of, or the time required for, performance of the Agreement, OWNER shall issue a change order in accordance with the procedures set forth in this Agreement.

C. In the event that a dispute arises between OWNER and CONTRACTOR regarding any of the matters specified in Paragraph (2) above, CONTRACTOR shall proceed with all work to be performed under the Agreement and CONTRACTOR shall not be excused from completing the Project as provided in the Agreement. In performing the work pursuant to this Paragraph, CONTRACTOR retains all rights provided by law which pertain to the resolution of disputes and protests between the contracting parties.

25. Claims.

A. Public work claims of \$375,000 or less between CONTRACTOR and OWNER are subject to the provisions of Article 1.5 (commencing with Section 20104) of Chapter 1 of Part 2 of the Public Contract Code for any contract entered into between January 1, 1991, and January 1, 1994. For purposes of this Paragraph and Article 1.5, "public work" has the same meaning as set forth in Sections 3100 and 3106 of the Civil Code; "claims" means a separate demand by CONTRACTOR for a time extension or payment of money or damages arising from work done by or on behalf of CONTRACTOR pursuant to the Agreement, and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to, or the amount of the payment which is disputed by OWNER.

B. Each claim must be submitted in writing five days after the damage was sustained or after the event or action giving rise to the claim and shall include all documents necessary to substantiate the claim. OWNER shall respond in writing within 45 days of receipt of the claim if the claim is less than or equal to \$50,000 ("\$50,000 claim") or within 60 days if the claim is over \$50,000 but less than or equal to \$375,000 ("\$50,000-\$375,000 claim"). In either case, OWNER may request in writing within 30 days of receipt of the claim any additional documentation supporting the claim or relating to any defenses to the claim which OWNER may have against CONTRACTOR. Any additional information shall be requested and provided upon mutual agreement of OWNER and CONTRACTOR.

C. OWNER's written response to the claim shall be submitted to CONTRACTOR within 15 days after receipt of the further documentation for \$50,000 claims or within 30 days after receipt of the further documentation for \$50,000-\$375,000 claims or within a period of time no greater than that taken by CONTRACTOR in producing the additional information, whichever is greater.

D. Within 15 days of receipt of OWNER's response, if CONTRACTOR disputes OWNER's written response, or within 15 days of OWNER's failure to respond within the time prescribed, CONTRACTOR shall provide written notification to OWNER demanding an informal conference to meet and confer ("Conference") to be scheduled by OWNER within 30 days. Following the Conference, if any claim or portion remains in dispute,

CONTRACTOR may file a claim as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions, the period of time within which a claim must be filed is tolled from the time CONTRACTOR submits the written claim pursuant to this section until the time that claim is denied as a result of the conference process, including any period of time utilized by the meet and confer process.

E. Pursuant to Public Contract Code Section 20104.2(f), this paragraph does not apply to tort claims and does not change the period for filing tort claims or actions specified by Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code.

F. If a civil action is filed, within 60 days but no earlier than 30 days following the filing of responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide that the parties select a disinterested third person mediator within 15 days, that mediation shall be commenced within 30 days of the submittal, and shall be concluded within 15 days of the commencement of the mediation unless time is extended upon a good cause showing to the court or by stipulation of the parties. If the parties fail to select a mediator within the 15-day period, any party may petition the court to appoint a mediator.

G. If the matter remains in dispute, the case shall be submitted to judicial arbitration as set forth in Public Contract Code Section 20104.4 (b)(1) through (b)(3).

H. In the event of a claim for an amount in excess of \$375,000, the parties shall follow the procedures applicable to claims over \$50,000 and less than or equal to \$375,000, and:

1. All such actions as are required by these procedures are to be completed prior to any resort to judicial action.
2. In the event of disputes not resolved by the parties, the parties agree to appoint a mediator mutually acceptable to both parties to resolve all disputes.
3. In the event the parties are unable to agree on a mediator, the mediator is to be selected by application to the Superior Court of the county in which OWNER is located for selection of the mediator from a list of names provided by the parties, each party submitting no more than three names.
4. The selected mediator shall set a mediation as soon as possible. In the event the dispute is not resolved by mediation, the parties may then resort to the judicial process.

I. In the event a dispute arises between the parties during the course of the Project, the parties shall attempt to resolve the dispute using the procedures set forth in this section. Pending resolution of the dispute, CONTRACTOR shall diligently continue to work on the Project to completion. CONTRACTOR agrees it will neither rescind the Agreement nor stop progress of the work, and CONTRACTOR's sole remedy shall be the

procedures set forth in this section.

26. Fingerprinting Workers.

A. CONTRACTOR shall comply with the applicable requirements of Education Code Sections 45125.1 and 45125.2 with respect to fingerprinting CONTRACTOR's employees. CONTRACTOR shall also ensure that each of its subcontractors on the Project complies with the applicable requirements of Sections 45125.1 and 45125.2. To this end, the CONTRACTOR and its subcontractors must provide for the completion of the certification form included in the Contract Documents prior to commencing work on the Project.

B. Should CONTRACTOR or any subcontractor feel its employees will have limited or less contact with OWNER pupils, application shall be made to the OWNER for a determination on that question. The determination by OWNER shall be final.

C. Use of Education Code Section 45122.2(a)(1), (2) or (3) for compliance with these fingerprinting requirements is subject to prior OWNER approval. The determination by OWNER on application of any of these sections shall be final.

D. In no event shall any employee of CONTRACTOR or its subcontractors come into contact with OWNER's pupils before the certification is completed and approved by OWNER.

27. Entire Agreement. The Agreement, including the Contract Documents incorporated by reference, constitutes the final, complete, and exclusive statement of the terms of the agreement between the parties pertaining to the construction project which is the subject of the Agreement, and supersedes all prior and contemporaneous understandings or agreements of the parties. No party has been induced to enter into this Agreement by, nor is any party relying on, any representation or warranty outside those expressly set forth in this Agreement.

Executed at _____, _____ County, California.

DATED: _____

OWNER

By _____

Title _____

DATED: _____

CONTRACTOR

By _____

Representative of Contractor

Address

Contractor's License Number

12-PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, the Bakersfield City School District, (referred to as "Owner"), has awarded to _____ (referred to as the "Contractor/ Principal") a contract for the work described as follows:

**Mt. Vernon Elementary School
Kitchen Addition
2161 Potomac Avenue
Bakersfield, California 93307-2426**

WHEREAS, Contractor/Principal is required by Division 3, Part IV, Title XV, Chapter 7 (commencing at Section 3247) of the California Civil Code to furnish a bond in connection with the contract;

NOW, THEREFORE, we, the Contractor/Principal and _____ as Surety, are held firmly bound unto Owner in the penal sum of _____ Dollars (\$_____), lawful money of the United States of America for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if the Contractor/Principal, his/her or its heirs, executors, administrators, successors, or assigns, or a subcontractor, shall fail to pay any person or persons named in Civil Code Section 3181 or fail to pay for any materials or other supplies used in, upon, for, or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or for amounts due under the Unemployment Insurance Code with respect to work or labor thereon of any kind, or shall fail to deduct, withhold, and pay over to the Employment Development Department any amounts required to be deducted, withheld, and paid over by Section 13020 of the Unemployment Insurance Code with respect to work and labor thereon of any kind, then said Surety will pay for the same, in or to an amount not exceeding the amount set forth above, and in case suit is brought upon this bond Surety will also pay such reasonable attorney's fees as shall be fixed by the court, awarded and taxed as provided in Division 3, Part IV, Title XV, Chapter 7 (commencing at Section 3247) of the California Civil Code.

This bond shall inure to the benefit of any of the persons named in Section 3181 of the California Civil Code so as to give a right of action to such person or their assigns in any suit brought upon this bond.

It is further stipulated and agreed that the Surety of this bond shall not be exonerated or released from the obligation of the bond by any change, extension of time for performance, addition, alteration, or modification in, to, or of any contract, plans, specifications, or agreement pertaining or relating to any scheme or work of improvement described above

or pertaining or relating to the furnishing of labor, materials, or equipment therefor, nor by any change or modification of any terms of payment or extension of the time for any payment pertaining or relating to any scheme or work of improvement described above, nor by any rescission or attempted rescission of the contract, agreement, or bond, nor by any conditions precedent or subsequent in the bond attempting to limit the right of recovery of claimants otherwise entitled to recover under any such contract or agreement or under the bond, nor by any fraud practiced by any person other than the claimant seeking to recover on the bond, and that this bond be construed most strongly against the Surety and in favor of all persons for whose benefit such bond is given, and under no circumstances shall Surety be released from liability to those for whose benefit such bond has been given, by reason of any breach of contract between the Owner and original contractor or on the part of any obligee named in such bond, but the sole conditions of recovery shall be that claimant is a person described in Section 3110 and 3112 of the California Civil Code and has not been paid the full amount of his/her or its claim and that Surety does hereby waive notice of any such change, extension of time, addition, alteration, or modification.

Any claims under this bond may be addressed to:

Name & address of Surety _____

Name & address of agent or representative in California, if different than above _____

Telephone # of Surety, or agent or representative in California _____

IN WITNESS WHEREOF, we have hereto set our hands and seals on this _____ day of _____, _____.

[SEAL]

Contractor/Principal

By: _____
Signature

Print Name and Title

Surety

By: _____
Signature

Print Name and Title

[SEAL AND NOTARIAL ACKNOWLEDGMENT OF SURETY]

13-PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, the Bakersfield City School District (referred to as "Owner"), has awarded to _____ (referred to as "Contractor/Principal") a contract for the work described as follows:

**Mt. Vernon Elementary School
Kitchen Addition
2161 Potomac Avenue
Bakersfield, California 93307-2426**

NOW, THEREFORE, we, the Contractor/Principal and _____, as Surety, are held firmly bound unto Owner in the penal sum of _____ Dollars (\$ _____), lawful money of the United States of America for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT, if the hereby bonded Contractor/Principal, its heirs, executors, administrators, successors, or assigns, shall in all things stand to and abide by and well and truly keep and perform all the undertakings, terms, covenants, conditions, and agreements in the said contract and any alteration thereof, made as therein provided, including but not limited to the provisions regarding contract duration, indemnification, and liquidated damages, all within the time and in the manner therein designated in all respects according to their true intent and meaning, then this obligation shall become null and void; otherwise, it shall be and remain in full force and effect.

As a condition precedent to the satisfactory completion of the contract, the above obligation shall hold good for a period of _____ year(s) after the acceptance of the work by the Owner, during which time if Contractor/Principal shall fail to make full, complete, and satisfactory repair and replacements and totally protect the Owner from loss or damage made evident during the period of _____ year(s) from the date of completion of the work, and resulting from or caused by defective materials or faulty workmanship, the above obligation in penal sum thereof shall remain in full force and effect. The obligation of Surety under this bond shall continue so long as any obligation of Contractor/Principal remains. Whenever Contractor/Principal shall be, and is declared by the Owner to be, in default under the contract, the Owner having performed the Owner's obligations under the contract, the Surety shall promptly remedy the default, or shall promptly:

1. Complete the contract in accordance with its terms and conditions; or

2. Obtain a bid or bids for completing the contract in accordance with its terms and conditions, and upon determination by Surety of the lowest responsive and responsible bidder, arrange for a contract between such bidder and the Owner, and make available as work progresses sufficient funds to pay the cost of completion less the balance of the contract price, but not exceeding, including other costs and damages for which Surety may be liable under this Performance Bond, the amount set forth above. The term "balance of the contract price" as used in this paragraph shall mean the total amount payable to Contractor/Principal by the Owner under the contract and any modifications to it, less the amount previously properly paid by the Owner to the Contractor/Principal.

Surety expressly agrees that the Owner may reject any contractor or subcontractor which may be proposed by Surety in fulfillment of its obligations in the event of default by the Contractor/Principal.

Surety shall not utilize Contractor/Principal in completing the contract nor shall Surety accept a bid from Contractor/Principal for completion of the work if the Owner, when declaring the Contractor/Principal in default, notifies Surety of the Owner's objection to Contractor/Principal's further participation in the completion of the work.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the Owner named herein or the successors or assigns of the Owner. Any suit under this bond must be instituted within the applicable statute of limitations period.

FURTHER, for value received, the Surety hereby stipulates and agrees that no change, extension of time, alternation, or modification of the Contract Documents, or of the work to be performed under them, shall in any way affect its obligations on this bond; and it does hereby waive notice of any change, extension of time, alteration, or modification of the Contract Documents or of work to be performed under them.

Contractor/Principal and Surety agree that if the Owner is required to engage the services of an attorney in connection with the enforcement of this bond, each shall pay Owner's reasonable attorney's fees incurred, with or without suit, in addition to the above amount.

Any claims under this bond may be addressed to:

Name & address of Surety

Name & address of agent or
representative in California, if different
than above _____
Telephone # of Surety, or agent or
representative in California _____

IN WITNESS WHEREOF, we have hereto set our hands and seals on this _____ day of
_____, _____.

[SEAL]

Contractor/Principal

By: _____
Signature

Print Name and Title

Surety

By: _____
Signature

Print Name and Title

[SEAL AND NOTARIAL ACKNOWLEDGMENT OF SURETY]

14-WORKERS' COMPENSATION CERTIFICATE

PROJECT TITLE: Kitchen Addition at Mt. Vernon Elementary School

OWNER: Bakersfield City School District

Labor Code Section 3700 provides:

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

"(a) By being insured against liability to pay compensation in one or more insurers duly authorized to write compensation insurance in this state.

"(b) By securing from the Director of Industrial Relations a certificate of consent to self-insure either as an individual employer, or as one employer in a group of employers, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his or her employees.

"(c) For any county, city, city and county, municipal corporation, public district, public agency, or any political subdivision of the state, including each member of a pooling arrangement under a joint exercise of powers agreement (but not the state itself), by securing from the Director of Industrial Relations a certificate of consent to self-insure against workers' compensation claims, which certificate may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to administer workers' compensation claims properly, and to pay workers' compensation claims that may become due to its employees. On or before March 31, 1979, a political subdivision of the state which on December 31, 1978, was uninsured for its liability to pay compensation, shall file a properly completed and executed application for a certificate of consent to self-insure against workers' compensation claims. The certificate shall be issued and be subject to the provisions of Section 3702."

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

Name of Contractor	Date
By: _____	
Signature	

Print Name	Title

[In accordance with Article 5(commencing at Section 1860), Chapter 1, Part 7, Division 2 of the Labor Code, the above certificate must be signed and filed with the awarding body prior to performing any work under the contract.]

15-GUARANTEE

PROJECT TITLE: Kitchen Addition at Mt. Vernon Elementary School

OWNER: Bakersfield City School District

We guarantee that the construction work described above has been performed in accordance with, and complies with, the Contract Documents. We agree to repair or replace any or all of the work, together with any other adjacent work which may be required in connection with it, that may prove to be defective in workmanship or material within a period of one year from the date of acceptance of the project by Owner and the filing of the final verified report with the Division of State Architect (DSA), ordinary wear and tear excepted.

In the event of our failure to comply with these conditions within the applicable time frame as determined by Owner pursuant to the Contact Documents, in no event later than one week after being notified in writing by Owner, we authorize Owner to proceed to have the defects repaired at our expense, for which we will pay the costs and charges upon demand.

Name of Contractor Date

By: _____
Signature

Print Name Title

Representative of Contractor
to be Contacted for Service: _____

Telephone Number of Contact: _____

16-FINGERPRINTING CERTIFICATION BY CONTRACTORS

Bakersfield City School District (referred to as "Owner")

Kitchen Addition at Mt. Vernon Elementary School

(Project Identification)

I, _____, am an
[type or print name]

- [check one]
- Owner of the company named below
 - Partner of the partnership named below
 - President or CEO of the corporation named below
 - Principal of the joint venture named below
 - Other [specify]

The contracting entity named below is a contractor on the referenced project and as such hereby certifies:

- [check one or more]
- [For compliance with Education Code Section 45125.2(a)(1)]
That a physical barrier will be erected at the workplace to limit employee contact with Owner's pupils.
 - [For compliance with Education Code Section 45125.2(a)(2)]
That the contracting entity named below will provide continual supervision and monitoring of the employees of the entity and its subcontractors through its employee _____.
It has been ascertained by the Department of Justice that the named employee has not been convicted of a violent or serious felony. Contractor has requested subsequent arrest information from the Department of Justice concerning such employee and will immediately notify District and remove the employee from the Project if subsequent arrest information indicates the employee has been convicted of a serious or violent felony.
 - [For compliance with Education Code Section 45125.2(a)(3)]
That the contracting entity named below has contracted with Owner for reimbursement of Owner expense incurred in providing surveillance by school personnel of the employees of the entity and its subcontractors on the Project.
 - [For compliance with Education Code Section 45125.1(g). Note: We believe this section may still be applicable to construction contractors where 45125.2(a) is insufficient to ensure pupil safety, e.g., where workers will be simultaneously working at various locations on a school site.]
That neither myself nor any employees of the contracting entity named below or its subcontractors on the Project who are required by law to submit or have their fingerprints submitted to the Department of Justice, and who may come in contact with pupils, have been convicted of a felony defined in Education Code Section 45122.1.
 - [For compliance where there is limited contact or less with pupils]
That the contracting entity named below is exempt from fingerprinting requirements as the Owner has determined the employees of the entity and its subcontractors will have no more than limited contact with Owner's pupils during the Project.

[name of contracting entity]

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

DATE

SIGNATURE

17-EXCLUSION OF LEAD PRODUCTS

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

PROJECT TITLE: Kitchen Addition at Mt. Vernon Elementary School

OWNER: Bakersfield City School District

Pursuant to the provisions of the California Education Code for construction, modernization, or renovation of school facilities, lead based paint, lead plumbing, and solders, or other potential sources of lead contamination shall not be utilized in the construction of any new school facility or the modernization or renovation of any existing school facility.

The Contractor agrees that sources and potential sources of lead contamination, whether in products or materials, will not be used in performing work under the Agreement.

At completion of work under the Agreement, the Contractor will warrant and represent to the Owner the following:

1. That no sources or potential sources of lead contamination were used in performing work under the Agreement.
2. That should any sources or potential sources of lead contamination be found to have been used by the Contractor or any subcontractor, supplier, or vendor on the Project, the Contractor will replace them, together with all related materials, at no cost to the Owner.
3. That should the replacement require any interruption in the normal operation of the school, the Contractor will pay all costs necessarily incurred to keep the school functioning with the least possible disruption to its day-to-day operations.

Executed at _____, California, on _____, 20____.

Contractor Name: _____

By: _____

Signed: _____

[Signature must match that on bid]

18-DAVIS BACON COMPLIANCE CERTIFICATION

PROJECT TITLE: Kitchen Addition at Mt. Vernon Elementary School

OWNER: Bakersfield City School District

I hereby certify that I will conform to the Davis Bacon Act regarding wages, on-site audits with 48-hour notice, payroll records, submittals of weekly certified payrolls to the Owner, and apprentice and trainee employment requirements.

Name of Contractor _____ Date _____

By: _____
Signature

Print Name _____ Title _____

***[THIS FORM IS TO BE USED ON CONSTRUCTION PROJECTS UNDER
CONTRACTS ENTERED INTO OR FINANCED BY OR WITH THE
ASSISTANCE OF THE FEDERAL GOVERNMENT.]***

19-ESCROW AGREEMENT FOR SECURITY DEPOSITS IN LIEU OF RETENTION

This Escrow Agreement is made and entered into by and between Owner
Bakersfield City School District, whose address is
1300 Baker Street, Bakersfield, California 93305,
and Contractor _____,
whose address is _____,
and Escrow Agent _____,
whose address is _____.

For the consideration set forth in this Agreement, the Owner, Contractor, and Escrow Agent agree as follows:

1. Pursuant to Section 22300 of the Public Contract Code of the State of California, Contractor has the option to deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by Owner pursuant to the Construction Agreement entered into between the Owner and Contractor for _____ in the amount of _____, dated _____. (referred to as the "Construction Agreement"). Alternatively, on written request of Contractor, Owner shall make payments of the retention earnings directly to the Escrow Agent. When Contractor deposits the securities as a substitute for retention earnings, the Escrow Agent shall notify the Owner within 10 days of the deposit. The market value of the securities at the time of the substitution shall be at least equal to the cash amount then required to be withheld as retention under the terms of the Construction Agreement between the Owner and Contractor. Securities shall be held in the name of _____ and shall designate the Contractor as the beneficial owner.
2. Owner shall make progress payments to Contractor for those funds which otherwise would be withheld from progress payments under the provisions of the Construction Agreement, provided the Escrow Agent holds securities in the form and amount specified above.
3. When Owner makes payments of retentions earned directly to the Escrow Agent, the Escrow Agent shall hold them for the benefit of Contractor until the time the escrow created under this Escrow Agreement is terminated. Contractor may direct investment of the payments into securities. All terms and conditions of this Escrow Agreement and the rights and responsibilities of the parties shall be equally applicable and binding when Owner pays the Escrow Agent directly.
4. Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account and all expenses of Owner. These expenses and payment terms shall be determined by Owner, Contractor, and Escrow Agent.

5. The interest earned on the securities or the money market accounts held in escrow, and all interest earned on that interest, shall be for the sole account of Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to the Owner.

6. Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from Owner to Escrow Agent that Owner consents to withdrawal of the amount sought to be withdrawn by Contractor.

7. Owner shall have a right to draw upon the securities in the event of default by Contractor. Upon seven days' written notice of the default to the Escrow Agent from Owner, Escrow Agent shall immediately convert the securities to cash and distribute the cash as instructed by Owner.

8. Upon receipt of written notification from Owner certifying that the work under the Construction Agreement is final and complete, and that Contractor has complied with all requirements and procedures applicable to the Construction Agreement, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all monies and securities on deposit and payment of fees and charges.

9. Escrow Agent shall rely on the written notifications from Owner and Contractor pursuant to Sections 6 to 8, inclusive, of this Escrow Agreement and Owner and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of the securities and interest as set forth above.

10. The names of the persons who are authorized to give written notice or to receive written notice on behalf of Owner and on behalf of Contractor in connection with the foregoing, and exemplars of their respective signatures, are as follows:

On behalf of Owner:

On behalf of Contractor:

Title

Title

Name [typed or printed]

Name [typed or printed]

Signature

Signature

Address

Address

On behalf of Escrow Agent:

Title

Name [typed or printed]

Signature

Address

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

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

Owner

Contractor

Title

Title

Name [typed or printed]

Name [typed or printed]

Signature

Signature

Escrow Agent

Title

Name [typed or printed]

Signature

20-SHOP DRAWING TRANSMITTAL

PROJECT TITLE: Kitchen Addition at Mt. Vernon Elementary School

OWNER: Bakersfield City School District

The procedure governing shop drawing submittals is contained in the Contract Documents. All requirements must be followed by the Contractor. Failure to comply with all requirements will constitute grounds for return of the shop drawing for proper resubmittal. The Contractor shall sequentially number each submittal, using this form.

Date	Submittal No.
From	To
This is:	
an original submittal	
a 2nd submittal	
a [] submittal	

Subject of Submittal:	Equipment Designation:	Specification Section(s):
-----------------------	------------------------	---------------------------

Check either (a) or (b)

- (a) We have verified that the material or equipment contained in this submittal meets all the requirements specified or shown (no exceptions).
- (b) We have verified that the material or equipment contained in this submittal meets all the requirements specified or shown, except for the following deviations (List deviations on attached sheet).

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. This shop drawing has been coordinated with all other shop drawings received to date by Contractor and this duty of coordination has not been delegated to subcontractors, material suppliers, the architect, or the engineers on this project.

Signature of Contractor or Supplier

21-DRUG-FREE WORKPLACE CERTIFICATION

PROJECT TITLE: Kitchen Addition at Mt. Vernon Elementary School

OWNER: Bakersfield City School District

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

Pursuant to Government Code Section 8355, every person or organization awarded a contract from a state agency shall certify that it will provide a drug-free workplace by doing all of the following:

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

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

I also understand that if the Owner determines that I have either (a) made a false certification or (b) violated this certification by failing to carry out the requirements of Section 8355, the contract awarded is subject to suspension of payments, termination, or both. I further understand that should I violate the terms of the Drug-Free Workplace Act of 1990, I may be subject to debarment in accordance with the requirements of Section 8350 and following sections.

I acknowledge that I am aware of the provisions of Government Code Section 8350 and following sections, and hereby certify that I will adhere to the requirements of the Drug-Free Workplace Act of 1990.

Name of Contractor

Signature

Print Name

Title

Date

22-CHANGE ORDER NO. _____

PROJECT TITLE: Kitchen Addition at Mt. Vernon Elementary School

OWNER: Bakersfield City School District

To: _____

**YOU ARE HEREBY DIRECTED TO PROVIDE THE EXTRA WORK
NECESSARY TO COMPLY WITH THIS CHANGE ORDER.**

DESCRIPTION OF CHANGE:

AGREED COST (This cost shall not be exceeded): \$ _____

ADJUSTMENTS TO CONTRACT PRICE:

Original Contract Price: \$ _____

Prior Change Order Totals: \$ _____

This Change Order Amount: \$ _____

New Contract Price: \$ _____

ADJUSTMENTS TO TIME FOR COMPLETION: _____

Original completion date: _____

Prior adjustments previously agreed: _____

Time for completion of this Change Order: _____

New completion date: _____

THE COMPENSATION (TIME AND COST) SET FORTH IN THIS CHANGE ORDER COMPRISES THE TOTAL COMPENSATION DUE THE CONTRACTOR FOR THE CHANGE DEFINED IN THE CHANGE ORDER, INCLUDING IMPACT ON UNCHANGED WORK. ACCEPTANCE OF THIS CHANGE ORDER CONSTITUTES A FULL AND COMPLETE ACCORD AND SATISFACTION OF ANY AND ALL CLAIMS BY CONTRACTOR ARISING OUT OF OR RELATING TO THE CHANGE ORDER, INCLUDING BUT NOT LIMITED TO CLAIMS FOR CONTRACT BALANCE AND RETENTION, TIME, EXTENDED FIELD OR HOME OFFICE, OR OTHER OVERHEAD, ALL ACCELERATION, IMPACT, DISRUPTION, AND DELAY DAMAGES, ANY AND ALL OTHER DIRECT AND/OR INDIRECT COSTS, CLAIMS BY SUBCONTRACTORS AND SUPPLIERS, AND ANY AND ALL OTHER CLAIMS AGAINST THE OWNER FOR TIME OR MONEY, FROM ANY SOURCE AND UNDER ANY LEGAL THEORY WHATSOEVER, AS TO THE SUBJECT OF THIS CHANGE ORDER. NO SIGNATURE UNDER PROTEST OR ACCOMPANIED BY RESERVATION OF RIGHTS OR PROTEST LANGUAGE, OR ANY OTHER ATTEMPTS TO AVOID SUCH WAIVER SHALL BE OF ANY FORCE OR EFFECT WHATSOEVER. NO ADDITIONS OR DELETIONS TO THIS CHANGE ORDER SHALL BE ALLOWED, EXCEPT WITH WRITTEN PERMISSION OF OWNER.

This Change Order is hereby agreed to, accepted, and approved.

On behalf of Owner:

On behalf of Contractor:

Title

Title

Name [typed or printed]

Name [typed or printed]

Signature

Signature

APPROVED AS TO FORM AND CONTENT:

On behalf of Architect:

Title

Name [typed or printed]

Signature Date

23-CERTIFICATE OF ATTENDANCE AT MANDATORY JOB WALK

On projects including a mandatory job walk, this form must be submitted with the bid or bidder will be declared "non-responsive"

PROJECT TITLE: Kitchen Addition at Mt. Vernon Elementary School

OWNER: Bakersfield City School District

It is the Owner's intention to provide all contractors with equal access to information regarding this project. Further, the Owner has issued plans and specifications to bidders and has allowed bidders the opportunity to inspect the site with knowledgeable personnel at the job walk. Therefore it is understood that the Owner may declare the bid non-responsive for any of the following conditions:

1. If a bidder attends the entire mandatory job walk but fails to complete this form;
2. If a bidder fails to attend the entire mandatory job walk;
3. If a bidder fails to attend the entire mandatory job walk but certifies that he was in attendance. *[NOTE: This may also lead to a determination that the bidder is non-responsive.]*

Please check one of the following:

I attended the entire mandatory job walk

-OR-

I did not attend the entire mandatory job walk.

I hereby certify under penalty of the perjury laws of the State of California that the foregoing is true and correct. Executed at _____, California, on _____, 20 ____.

Firm Name _____

By _____

Signed _____

Printed Name _____

Title _____

24-CONTRACTOR'S QUALIFICATIONS QUESTIONNAIRE

TO BE SUBMITTED WITH THE BID WHEN THERE
HAS BEEN NO PREQUALIFICATION PROCESS

PROJECT TITLE: Kitchen Addition at Mt. Vernon Elementary School

OWNER: Bakersfield City School District

The prospective Bidder shall furnish all the following information accurately and completely. Failure to fully and completely comply with this requirement may result in rejection of any bid submitted. Additional sheets may be attached if necessary. "You" or "your" as used in this questionnaire refers to the Bidder's firm and any of its owners, officers, directors, shareholders, parties, or principals. Owner has discretion to request additional information depending on the project.

—WARNING—

Certain information may lead to a determination of non-responsibility and rejection of the bid.

(1) Firm name and address: _____

(2) Telephone: _____

(3) Type of firm: (check one) Individual Partnership Corp.

(4) License No. _____ Class: _____

Name of license holder:

(5) Have you or any of your principals ever been licensed under a different name or different license number? Response must include information pertaining to principals' association outside of the firm bidding this Project. If yes, give name and license number: _____.

(6) Names and titles of all principals of the firm:

_____	_____
_____	_____
_____	_____

(7) Number of years as contractor. Include only years in this type of construction and only the years with the current entity in its current form: _____ Years

(8) Person who inspected work site for your firm:

Name and Title: _____
Date of Inspection: _____

(9) Years of experience your firm has in public school construction work:

As general contractor: _____ As subcontractor: _____

(10) In the last five years has your firm or any of its principals defaulted so as to cause a loss to a surety? Response must include information pertaining to principals' associations outside of the firm bidding this Project. If the answer is yes, give date, name, and address of surety and details.

(11) In the last five years have you or any of your principals been assessed liquidated damages for any project? Response must include information pertaining to principals' associations outside of the firm bidding this Project. If yes, explain:

(12) In the last five years have you or any of your principals been in litigation or arbitration or a dispute of any kind on a question or questions relating to a public construction project? Response must include information pertaining to principals' association outside of the firm bidding this Project. If yes, provide name of public agency and details of the dispute. Attach additional pages as necessary.

(13) In the last five years have you or any of your principals ever failed to complete a project? Response must include information pertaining to principals' association outside of the firm bidding this Project. If yes, provide owner's name and details. Attach additional pages as necessary.

(14) In the last five years have you or any of your principals been assessed back-charges on any public works construction project? If so, explain, including the identity of the public entity, the basis for their claims, and the final result. Attach additional pages as necessary.

(15) In the last five years have you or any of your principals ever failed to complete a project within the time frame originally set for completion, plus any extension of time granted for weather delays? An extension of time for any reason other than weather delays requires an explanation. Response must include information pertaining to principals' association outside of the firm bidding this Project. If yes, provide owner's name and details. Attach additional pages as necessary.

(16) List names, addresses, and telephone numbers of three architects or engineers with whom you have worked on a public works project in the last five years:

Project One: _____

Project Two: _____

Project Three: _____

(17) Conflicts of Interest: Do you now or have you in the last five years had any direct or indirect business, financial, or other connection with any official, employee, or consultant of the OWNER or architect? If yes, describe. Attach additional pages as necessary.

(18) In the last five years have you or any of your principals filed a claim for additional compensation from a public entity on a construction project? If yes, explain and include the identity of the public entity, the basis for the claim, the response by the public entity, and the final result. Attach additional pages as necessary.

(19) In the last five years have you or any of your principals ever failed to prequalify, or been deemed unqualified, on any public works construction project? If yes, explain and include the identity of the public entity, the basis for their claims, and the final result. Attach additional pages as necessary.

(20) In the last five years, have you or any of your principals ever been declared a “non-responsible” bidder on any public works construction project? If yes, explain and include the identity of the public entity, the basis for their claims, and the final result. Attach additional pages as necessary.

(21) Staff/Roster Functions: List all members of your staff who will be assigned or responsible for work as a team member on this Project (except clerical) and show job titles, functions, years with firm, and projects completed for company. Include company officers, responsible managing employee (RME), project manager, and superintendent. Provide the following information for each individual (copy this page as many times as required).

Name and Title:

Function:

Years with firm:

Has the individual had prior exposure as a team member on one of your projects?

_____ Yes _____ No

List of all school projects this person has completed for you:

Provide an organizational chart reflecting your proposed project team for the Project, including all persons on your project team.

(22) Surety: Indicate the names of all surety companies utilized by you in the last 10 years. Attach additional pages as necessary.

_____ Surety Name & Address	_____ Period Covered
_____ Surety Name & Address	_____ Period Covered
_____ Surety Name & Address	_____ Period Covered
_____ Surety Name & Address	_____ Period Covered

(23) Attach a notarized statement from surety company(ies) proposed to be utilized on this Project, indicating your total bonding capacity and certifying that:

- A. Currently available bonding capacity exceeds the value of your contract, as estimated by the OWNER, and;
- B. Surety(ies) will provide bonding of the project in the event you are awarded Project.

(24) Insurance: Provide a notarized statement from your workers' compensation carrier specifying your current "Experience Modification Rate" for workers' compensation for the State of California. Provide a list of above-referenced ratings and corresponding companies for the last five years.

(25) Safety:

- A. Does your firm have a written Safety Program:
Yes _____ No _____ (If yes, attach copy.)
- B. Does your firm have personnel permanently assigned to safety?
Yes _____ No _____ (If yes, provide names and duties.)

(26) Give the public entity's name, telephone number, and the name of the contact person for the three largest public works projects performed for a public entity, other than a school/college/university, that you have completed in the last five years: Attach additional sheets as necessary.

(27) List of References: Provide information on the three largest projects performed for a public school, college, or university in the last five years.

Contract 1. Name : _____

Address and telephone: _____

Contact person: _____

Type of construction project: _____

Dates of commencement and completion of construction project: _____

Contract amount: _____

Architect: _____

Architect's address and telephone: _____

DSA or public agency inspector: _____

Address and telephone: _____

Contract 2. Name : _____

Address and telephone: _____

Contact person: _____

Type of construction project: _____

Dates of commencement and completion of construction project: _____

Contract amount: _____

Architect: _____

Architect's address and telephone: _____

DSA or public agency inspector: _____

Address and telephone: _____

Contract 3. Name: _____

Address and telephone: _____

Contact person: _____

Type of construction project: _____

Dates of commencement and completion of construction project: _____

Contract amount: _____

Architect: _____

Architect's address and telephone: _____

DSA or public agency inspector: _____

Address and telephone: _____

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

Executed this ____ day of _____, 20____, at _____

_____ (City, County), State of _____.

Signature

Print Name

Title

CALIFORNIA DISABLED VETERAN BUSINESS ENTERPRISE (DVBE) PROGRAM REQUIREMENTS

(Revision Date 12/06/2007)

Please read the requirements and instructions carefully before you begin.

AUTHORITY. The Disabled Veteran Business Enterprise (DVBE) Participation Goal Program for State contracts is established in Public Contract Code (PCC), §10115 et seq., Military and Veterans Code (MVC), §999 et seq., and California Code of Regulations (CCR), Title 2, §1896.60 et seq.

The minimum DVBE participation percentage (goal) is 3% for this solicitation unless another percentage is specified in the solicitation.

INTRODUCTION. The bidder must complete the identified forms and fully document at least one of the options (A, B or C) in this document to comply with this solicitation's DVBE program requirements. Bids or proposals (hereafter called "bids") that **fail to submit all required forms and fully document and meet one of the DVBE program requirement options shall be considered non-responsive.**

Information submitted by the intended awardee to comply with this solicitation's DVBE requirements will be verified by the State. If evidence of an alleged violation is found during the verification process, the State shall initiate an investigation, in accordance with the requirements of the PCC §10115, et seq., and MVC §999 et seq., and follow the investigatory procedures required by the CCR §1896.80. Contractors found to be in violation of certain provisions may be subject to loss of certification, penalties and/or contract termination.

Only State of California, Office of Small Business and DVBE Services (OSDS), certified DVBEs (hereafter called "DVBE") who perform a commercially useful function relevant to this solicitation, may be used to satisfy the DVBE program requirements. The criteria and definition for performing a commercially useful function are contained herein on the page entitled **Resources & Information**. Bidders are to verify each DVBE subcontractor's certification with OSDS to ensure DVBE eligibility.

PLEASE READ ALL INSTRUCTIONS CAREFULLY. These instructions contain information about the DVBE program requirements, bidder responsibilities, requirements for performing and documenting each of the three available options (Option A, Option B, or Option C) as detailed below, and the DVBE Bid Incentive. Bidders are responsible for thorough review and compliance with these instructions. Complete and document your option selection and related information on the forms identified herein.

To meet the DVBE program requirements, bidders must complete and fully document at least one of the following compliance options:

Option A - Commitment to full DVBE participation - For a bidder who is a DVBE or who is able to meet the commitment to use identified certified DVBE(s) to fulfill the full DVBE participation goal.

Option B - Good Faith Effort - For a bidder documenting its completed effort, made prior to the bid due date, to obtain DVBE participation that may result in partial or no DVBE participation. (For partial participation, identified certified DVBE(s) must be used).

Option C - Business Utilization Plan - For a bidder using an annual plan (subject to pre-bid submission approval) to satisfy DVBE participation requirements. Applies only to solicitations for goods and information technology.

OPTION A – COMMITMENT -- Commit to meet or exceed the DVBE participation requirement in this solicitation by either Method A1 (bidder is a California certified DVBE) or A2 (bidder is not a California certified DVBE). Bidders must document DVBE participation commitment by completing and submitting the attached Documentation of Disabled Veteran Business Enterprise Program Requirements (STD. 840) and the Bidder Declaration (GSPD-05-105) located elsewhere within the solicitation document. Failure to complete and submit the required forms as instructed shall render the bid non-responsive.

At the State's option prior to award of the contract, a written confirmation from each DVBE subcontractor identified on the Bidder Declaration must be provided. As directed by the State, the written confirmation must be signed by the bidder and/or the DVBE subcontractor(s). The written confirmation may request information that includes but is not limited to the DVBE scope of work, work to be performed by the DVBE, term of intended subcontract with the DVBE, anticipated dates the DVBE will perform required work, rate and conditions of payment, and total amount to be paid to the DVBE. If further verification is necessary, the State will obtain additional information to verify the above requirements.

Method A1. Certified DVBE bidder:

- a. Commit to performing at least 3% of the contract bid amount (unless otherwise specified) with the prime bidder's firm or in combination with another DVBE(s).
- b. Document option intention on the STD. 840 (Section A) and document DVBE participation on the Bidder Declaration GSPD-05-105.
- c. At the State's option a DVBE bidder working in combination with other DVBEs shall submit proof of its commitment by submitting a written confirmation from the DVBE(s) identified as a subcontractor on the Bidder Declaration. When requested, the document must be submitted to the address or facsimile number specified and within the timeframe identified in the notification. Failure to submit the written confirmation as specified may be grounds for bid rejection.

Method A2. Non-DVBE bidder:

- a. Commit to using certified DVBE(s) for at least 3% (unless otherwise specified) of the bid amount.
- b. When a bidder commits to less than the required 3% DVBE participation or its commitment may fall below 3% such as when specific line items/groups are not selected for award, then Option B, Good Faith Effort must be completed.
- c. Document option intention on the STD. 840 (Section A) and document DVBE participation on the Bidder Declaration GSPD-05-105. Note: If Option B is selected, see Good Faith Effort documentation requirements below.
- d. At the State's option prior to contract award, a bidder is to submit proof of its commitment by submitting a written confirmation from each DVBE identified as a subcontractor on the Bidder Declaration GSPD-05-105. The awarding department contracting official named in the solicitation may contact each listed DVBE, by mail, fax or telephone, for verification of the bidder's submitted DVBE information. When requested, the document must be submitted to the address or facsimile number specified and within the timeframe identified in the notification. Failure to submit the written confirmation as specified may be grounds for bid rejection.

OPTION B – GOOD FAITH EFFORT (GFE) performance and documentation requirements must be completely satisfied prior to bid submission if the bidder is unable to obtain and commit to the full DVBE participation percentage goal (Option A) and does not exercise Option C. Perform and document the following Steps 1 through 5 on both pages of the attached STD. 840 form. Failure to perform and document GFE Steps 1 through 5 as instructed, which includes properly completing and submitting both pages of STD. 840 and the Bidder Declaration GSPD-05-105, shall result in the bid being deemed non-

responsive. Step 3, Advertisement, is required unless specifically waived for this solicitation due to time limits imposed by the awarding department.

Step 1: Awarding Department (PCC §10115.2[b][1])

Contact the department's contracting official named in this solicitation for any DVBE suppliers, if available, who may have identified themselves as potential subcontractors or to obtain suggestions for search criteria to possibly identify DVBE suppliers for the solicitation. The contact must be fully documented and the results described on the STD. 840 (Page 1), Section B, Step 1.

Step 2: Other State and Federal Agencies, and Local Organizations (PCC §10115.2[b][2])

All three entities must be contacted. For searches that are accomplished online, attach screen print(s) of Web results for verification. The screen prints should be current and coincide with the goods/services sought in the State's solicitation.

STATE: Access the list of all certified DVBEs by using the Department of General Services, Procurement Division (DGS-PD), Office of Small Business and DVBE Services (OSDS) online certified firm database at www.pd.dgs.ca.gov/smbus. Begin by selecting "Search for Certified SBs and DVBEs by Specific Criteria." Search by Keywords and/or click on "Include SIC Codes in Search" if you wish to also search by SIC codes. You should also check for subcontractor ads that may be placed on the California State Contracts Register (CSCR) for this solicitation prior to the closing date. You may access the CSCR at: <http://www.cscr.dgs.ca.gov/cscr/>. For questions regarding the online certified firm database and the CSCR, please call the OSDS at (916) 375-4940. All contacts must be fully documented and the results described on the STD. 840 (Page 1), Section B, Step 2.

FEDERAL: Search the U.S. Small Business Administration's (SBA) Central Contractor Registration (CCR) on-line database at www.ccr.gov/ to identify potential DVBEs and click on the "Dynamic Small Business Search" button. Search options and information are provided on the CCR Dynamic Small Business Search site. First time users should click on the "help" button for detailed instructions. You must fully document this contact and describe the results on the STD. 840 (Page 1), Section B, Step 2.

LOCAL: Contact at least one local DVBE organization to identify DVBEs. For a list of local DVBE organizations, please refer to the DVBE Resource Packet that may be accessed online (www.pd.dgs.ca.gov/smbus - select "DVBE Resource Packet") or obtain a hardcopy by requesting it from DGS-PD Office of Small Business and DVBE Services (see the Resources & Information page provided herein). You must fully document your contact with local DVBE organizations and describe the results on the STD. 840 (Page 1), Section B, Step 2.

Step 3: Advertisements (PCC §10115.2[b][3])

Advertisements are mandatory unless waived by the awarding department within the solicitation.

CONTENT REQUIREMENTS: Include all of the following in your advertisement(s): (1) company name; (2) contact name; (3) address; (4) telephone and facsimile numbers (if applicable); (5) e-mail address (if applicable); (6) the State's solicitation number; (7) description of goods and/or services for which subcontractor participation is sought (Note: It must be goods and/or services for which the subcontractor will be performing a commercially useful function); (8) the location(s) of work to be performed; (9) the State's bid due date and/or your due date for receiving DVBE responses.

HOW MANY & WHERE TO PUBLISH: Bidders must publish at a minimum, two (2) ads: one (1) each in a trade paper and a DVBE focus paper unless the paper has a dual purpose (fulfilling both trade and focus requirements as defined in CCR, Title 2, §1896.61(k)), in which case one (1) ad is acceptable in lieu of the two (2) mentioned above. Please see the DVBE Resource Packet for a list of acceptable publications.

WHEN: Pursuant to CCR §1896.63(2), advertisements must be published after the solicitation's release date and at least 14 days prior to the bid due date, unless a different time period is expressly established in this solicitation.

DOCUMENT & SUBMIT: On the STD. 840 (Page 2), Section C, Step 3, document the publication name(s) where advertisement(s) were published, the contact name and phone number, and the date of publication. Include a copy of the advertisement(s) with your bid.

Step 4: Invitations to Participate (PCC §10115.2[b][4])

WHO: Invite (solicit) DVBEs who can provide relevant goods and/or services to this solicitation to subcontract with you. Conducting Steps 1 through 3 produces a list of DVBEs from which you may choose potential DVBE subcontractors to contact. Bidders are advised to contact as many DVBEs (who provide relevant goods and/or services in the applicable location(s)) as possible. **Only California certified DVBEs should be contacted** -- please refer non-California certified DVBEs to the OSDS to learn about certification (see the Resources & Information page for contact information).

FOR WHAT: Solicit DVBEs for goods and/or services relevant to the State's solicitation. If you are unable to identify specific portions of the proposed contract to subcontract, the State encourages bidders to avoid making a predetermination that no DVBEs are able to perform or no portions of the work can be subcontracted, without first contacting and soliciting participation from them. This allows DVBEs to respond whether they can or cannot provide goods or services related to the solicitation, and provides a bidder with responses for consideration.

HOW TO INVITE & CONTENT REQUIREMENTS: **Written invitations are required.** At a minimum, invitations must contain all of the following: (1) company name; (2) contact name; (3) address; (4) telephone and facsimile (if applicable) numbers; (5) return e-mail address (if applicable); (6) the State's solicitation number; (7) description of goods and/or services for which subcontractor participation is sought (Note: It must be goods and/or services for which the subcontractor will be performing a commercially useful function); (8) the location(s) of work to be performed; (9) the State's bid due date and/or your due date for receiving DVBE responses.

The invitation should also include the anticipated schedule for subcontractor performance and terms/conditions related to payment of the subcontractor.

WHEN: Provide DVBEs with a reasonable time period to receive and respond to your invitation, and to be considered by you for participation as described in Step 5 (below), prior to your bid submission.

DOCUMENT & SUBMIT: Bidders must document the completed contacts on STD. 840 (Page 2), Section C. Attach additional copies of STD. 840A as necessary to list your DVBE contacts. You are required to attach a copy of: (1) each invitation or offer sent by mail, fax or e-mail; and (2) should include confirmation of transmittal or delivery. Your bid may be considered non-responsive if it fails to include copies of the written invitations and delivery confirmations.

Step 5: Consider all responding DVBEs for contract participation (PCC §10115.2[b][5])

Consideration must be based on business needs for this contract and the same evaluation criteria must be applied to each potential DVBE subcontractor offering the same goods and services. Any firm selected for participation must be documented on the Bidder Declaration GSPD-05-105. Bidders must commit to using the certified DVBEs in the capacity and for the amount identified on the GSPD-05-105. Any firm not selected must be identified on the STD. 840 (Page 2), Section C, and the reason for non-selection documented on the form. Attach additional copies of STD. 840A as necessary to list all of your DVBE contacts that were not selected.

OPTION C – THE DVBE BUSINESS UTILIZATION PLAN (BUP) option permits bidders to submit an approved DVBE BUP to satisfy DVBE participation solicitation requirements up to 3%. **DVBE BUPs apply only to solicitations for goods and Information Technology (IT) goods and services.** DVBE BUPs are a company’s commitment to expend a minimum of 3% of its total statewide contract dollars with DVBEs -- this percentage is based on all of its contracts held in California, not just those with the State. DVBE BUPs must be submitted to and approved by the DGS-PD prior to the bid due date. Please call the DGS-PD, Office of Small Business and DVBE Services for assistance. Bidders choosing this option must properly complete and submit STD. 840 (Section A), the Bidders Declaration (GSPD-05-105), and include a copy of its approval letter with the bid; failure to submit these documents shall render your bid non-responsive.

DVBE BID INCENTIVE. Unless stated elsewhere in the solicitation that the DVBE incentive has been waived, in accordance with Section 999.5(a) of the Military and Veterans Code an incentive will be given to bidders who provide DVBE participation. For evaluation purposes only, the State shall apply an incentive to bids that propose California certified DVBE participation as identified on the Bidder Declaration GSPD-05-105 and confirmed by the State. The incentive amount for awards based on low price will vary in conjunction with the percentage of DVBE participation. Unless a table that replaces the one below has been expressly established elsewhere within the solicitation, the following percentages will apply for awards based on low price.

Confirmed DVBE Participation of:	DVBE Incentive:
5% or Over	5%
4% to 4.99% inclusive	4%
3% to 3.99% inclusive	3%
2% to 2.99% inclusive	2%
1% to 1.99% inclusive	1%

As applicable: (1) Awards based on low price - the net bid price of responsive bids will be reduced (for evaluation purposes only) by the amount of DVBE incentive as applied to the lowest responsive net bid price. If the #1 ranked responsive, responsible bid is a California certified small business, the only bidders eligible for the incentive will be California certified small businesses. The incentive adjustment for awards based on low price cannot exceed 5% or \$100,000, whichever is less, of the #1 ranked net bid price. When used in combination with a preference adjustment, the cumulative adjustment amount is not to exceed \$100,000.

(2) Awards based on highest score - the solicitation shall include an individual requirement that identifies incentive points for DVBE participation.

RESOURCES AND INFORMATION

For questions regarding bid documentation requirements, **contact the contracting official at the awarding department for this solicitation.** In accordance with Public Contract Code Section 10115.2(b)(3), bidders must advertise in trade and focus publications unless the requirement is waived. The Department of General Services, Procurement Division (DGS-PD) publishes a list of trade and focus publications to assist bidders in meeting these contract requirements. To obtain this list, please contact the DGS-PD Office of Small Business and DVBE Services and request the "DVBE Resource Packet."

U.S. Small Business Administration (SBA):
Use the Central Contractor Registration (CCR) on-line database.
Internet contact only –Database: www.ccr.gov/.

FOR:
Service-Disabled Veteran-owned businesses in California (Remember to verify each DVBE's California certification.)

Local Organizations (see the DVBE Resource Packet available from DGS-PD DVBE Program Section listed below)

FOR:
List of potential DVBE subcontractors

DGS-PD Office of Small Business and DVBE Services (OSDS)
707 Third Street, Room 1-400, West Sacramento, CA 95605

Website: www.pd.dgs.ca.gov/smbus

OSDS Receptionist, 8 am-5 pm: (916) 375-4940

PD Receptionist, 8 am-5 pm: (800) 559-5529

Fax: (916) 375-4950

Email: osdchelp@dgs.ca.gov

FOR:

- Directory of California-Certified DVBEs
- Certification Applications
- Certification Information
- Certification Status, Concerns
- General DVBE Program Info.
- DVBE Resource Packet
- DVBE Business Utilization Plan
- Small Business/DVBE Advocates

ADVERTISEMENT FORMAT EXAMPLE

This example offers a suggested format that includes required information outlined in Option B, Good Faith Effort, Step 3. You can substitute the applicable information for the bolded, italicized words.

DVBEs are invited to participate as a potential subcontractor to perform a commercially useful function specific to ***DGS' IFB No. 12345 for fencing materials in Chowchilla.***

***DVBE responses due to me 1/1/02;
Bids due to the State 1/15/02.***

Contact: ***ABC Company***
Jane Doe, General Manager
123 Main Street, Sacramento, CA 95814
voice: ***555/555-5555***; fax: ***555/555-5556***
or e-mail: ***jane.doe@abcco.com***

Commercially Useful Function Definition

California Code of Regulations, Title 2, § 1896.61(l):

The term "DVBE contractor, subcontractor or supplier" means any person or entity that satisfies the ownership (or management) and control requirements of §1896.61(f); is certified in accordance with §1896.70; and provides services or goods that contribute to the fulfillment of the contract requirements by performing a commercially useful function.

As defined in MVC §999, a person or an entity is deemed to perform a "commercially useful function" if a person or entity does **all** of the following:

- Is responsible for the execution of a distinct element of the work of the contract.
- Carries out the obligation by actually performing, managing, or supervising the work involved.
- Performs work that is normal for its business services and functions.
- Is not further subcontracting a portion of the work that is greater than that expected to be subcontracted by normal industry practices.

A contractor, subcontractor, or supplier will not be considered to perform a commercially useful function if the contractor's, subcontractor's, or supplier's role is limited to that of an extra participant in a transaction, contract, or project through which funds are passed in order to obtain the appearance of disabled veteran business enterprise participation.

DOCUMENTATION OF DISABLED VETERAN BUSINESS ENTERPRISE PROGRAM REQUIREMENTS

STD. 840 (REV. 3/2007)

A. Designation Of Option – Check the appropriate box(es) to indicate the option(s) with which you choose to comply, complete the applicable sections and attach the required supporting documentation. You are advised to read all instructions carefully prior to completing this form. Remember that only California certified DVBEs who can provide related goods and/or services may be used to satisfy these program solicitation requirements. DVBEs must perform a commercially useful function. During contract performance, all requests for substituting DVBE subcontractors must be made in accordance with the provisions of California Code of Regulations, Title 2, §1896.64(c).

OPTION A – I commit to meeting the full DVBE Agreement participation requirement.

Complete: STD. 840, Section A (check the box on this form) and Bidder Declaration form GSPD-05-105 (located elsewhere in the solicitation)

OPTION B – I performed and documented a Good Faith Effort (GFE) in an attempt to obtain DVBE participation.

Complete: STD. 840, Section A (check the box on this form), STD. 840, Section B (for GFE Steps 1 & 2), STD. 840 (REVERSE), Section C (for GFE Steps 3-5), and Bidder Declaration form GSPD-05-105 (located elsewhere in the solicitation)

OPTION C – I submit a copy of my firm’s “Notice of Approved DVBE Business Utilization Plan.”

Complete: STD. 840, Section A (check the box on this form) and Bidder Declaration form GSPD-05-105 (located elsewhere in the solicitation)

B. Documentation of Good Faith Effort Steps 1 and 2 – Full information must be provided. Remember to carefully read all instructions prior to completing this form. Please refer to the Resources & Information page for detailed contact information.

STEP 1. Contact the Awarding Department (the contracting official, unless another contact is specified) to identify potential DVBE subcontractors, and document this contact below.

Date Contacted / /	Contact Name	Telephone Number () - ext.
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Describe Result

STEP 2. Contact all of the following and document your contacts as required: Other State and federal agencies and local organizations to identify potential DVBE subcontractors. **Attach screen print(s) of Web Results for verification.**

Other State Agency – Procurement Division, Office of Small Business and DVBE Services (OSDS)

PHONE CONTACT OR ONLINE SEARCH	Date / /	Telephone Number (916) 375-4940	Contact Name	<input type="checkbox"/> I contacted the OSDS for a list of California certified DVBEs.
	Date / /	Internet Address www.pd.dgs.ca.gov/smbus		<input type="checkbox"/> I searched the OSDS online database to identify California certified DVBEs.

Describe Result

Federal Agency – U.S. Small Business Administration (SBA) online database

Date / /	Internet Address www.ccr.gov/	<input type="checkbox"/> I searched the federal online database for California DVBEs.
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Describe Result

Local DVBE Organizations – Contact at least one local DVBE organization – refer to the DVBE Resource Packet for a list of acceptable contacts. (www.pd.dgs.ca.gov/smbus – select “DVBE Resource Packet”)

Date / /	Organization Name	Contact Name	Telephone Number and/or Internet Address () - www.
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Describe Result

Date / /	Organization Name	Contact Name	Telephone Number and/or Internet Address () - www.
-------------	-------------------	--------------	--

Describe Result

Go to Page 2, Section C to continue Good Faith Effort documentation =>

DOCUMENTATION OF DISABLED VETERAN BUSINESS ENTERPRISE PROGRAM REQUIREMENTS

STD 840 (REV. 3/2007) (REVERSE)

C. Documentation of Good Faith Effort Steps 3, 4 and 5 – Full information must be provided.

STEP 3. Publish advertisements: At least two (2) advertisements: One (1) ad in an accepted trade paper; and one (1) ad in an accepted DVBE focus paper (please see the DVBE Resource Packet for a list of all accepted publications and a sample advertisement format); unless the paper is an approved dual purpose (fulfilling both trade and focus requirements), in which case one (1) ad is acceptable. **Document this step as required and remember to attach a copy of your advertisement(s).**

Focus Paper Name (list full name)	Contact Name	Telephone Number () -
Address		Date Ad Published / /
Trade Paper Name (list full name)	Contact Name	Telephone Number () -
Address		Date Ad Published / /

I certify the ad was placed to reach both trade and focus audiences through this one publication.

Trade and Focus Paper Name (list full name)	Contact Name	Telephone Number () -
Address		Date Ad Published / /

STEP 4 & STEP 5. Document your completed contacts with (Step 4) and consideration of (Step 5), relevant DVBEs. Business reasons for non-selection must be explained. Attach additional pages to list all other DVBE contacts (you may use STD. 840A). Copies of all written invitations must be attached. Delivery confirmations should also be attached and submitted with the bid.

Date Contacted / /	DVBE Company Name		
DVBE Contact Name & Reference #	Telephone Number () - ext.	Fax Number () -	E-mail (if available)
Street Address, City, State, and Zip Code			

DVBE was selected and is listed on the GSPD-05-105 DVBE not selected for the following business reasons:

Date Contacted / /	DVBE Company Name		
DVBE Contact Name & Reference #	Telephone Number () - ext.	Fax Number () -	E-mail (if available)
Street Address, City, State, and Zip Code			

DVBE was selected and is listed on the GSPD-05-105 DVBE not selected for the following business reasons:

Date Contacted / /	DVBE Company Name		
DVBE Contact Name & Reference #	Telephone Number () - ext.	Fax Number () -	E-mail (if available)
Street Address, City, State, and Zip Code			

DVBE was selected and is listed on the GSPD-05-105 DVBE not selected for the following business reasons:

ATTACH ADDITIONAL PAGES (OR USE STD. 840A) TO LIST ALL OTHER DVBE CONTACTS

ADDITIONAL DISABLED VETERAN BUSINESS ENTERPRISE CONTACTS

STD. 840A (REV. 3/2007)

This document may be used as a continuation from Section C, STD. 840, Steps 4 & 5

Date Contacted / /	DVBE Company Name		
DVBE Contact Name & Reference #	Telephone Number () - ext.	Fax Number () -	E-mail (if available)
Street Address, City, State, and Zip Code			

DVBE was selected and is listed on the GSPD-05-105 DVBE not selected for the following business reasons:

Date Contacted / /	DVBE Company Name		
DVBE Contact Name & Reference #	Telephone Number () - ext.	Fax Number () -	E-mail (if available)
Street Address, City, State, and Zip Code			

DVBE was selected and is listed on the GSPD-05-105 DVBE not selected for the following business reasons:

Date Contacted / /	DVBE Company Name		
DVBE Contact Name & Reference #	Telephone Number () - ext.	Fax Number () -	E-mail (if available)
Street Address, City, State, and Zip Code			

DVBE was selected and is listed on the GSPD-05-105 DVBE not selected for the following business reasons:

Date Contacted / /	DVBE Company Name		
DVBE Contact Name & Reference #	Telephone Number () - ext.	Fax Number () -	E-mail (if available)
Street Address, City, State, and Zip Code			

DVBE was selected and is listed on the GSPD-05-105 DVBE not selected for the following business reasons:

Date Contacted / /	DVBE Company Name		
DVBE Contact Name & Reference #	Telephone Number () - ext.	Fax Number () -	E-mail (if available)
Street Address, City, State, and Zip Code			

DVBE was selected and is listed on the GSPD-05-105 DVBE not selected for the following business reasons:

DVBE Program Requirements Supplier Checklist (Rev. 2-28-2005)

Please do not submit this checklist with your bid. It is provided for your use only. Checking every box of your elected compliance option does not guarantee that your bid will be deemed compliant.

OPTION A: COMMITMENT TO DVBE AGREEMENT PARTICIPATION

- STD. 840 included with bid
- Designated the Commitment Option in Section A – Checked the first box of the form STD. 840
- Bidder Declaration form GSPD-05-105 completed and included with bid
- Proposed DVBE participation meets the 3% requirement (unless a different percentage is specified)

OPTION B: GOOD FAITH EFFORT (GFE)

- STD. 840 included with bid
- Designated the GFE Option in Section A – checked the second box of the form STD. 840
- Bidder Declaration form GSPD-05-105 completed and included with bid (any participation obtained is identified on the form)
- (Step 1) Contacted the Awarding Department and listed the contact information and results
- (Step 2) Contacted Other State agency (Office of Small Business and DVBE Services) and listed the contact and results – if a DVBE search was conducted online, included a screen print with bid
- (Step 2) Searched the Federal U.S. Small Business Administration (SBA) using the Central Contractor Registration (CCR) on-line database, noted the results and included a screen print with bid
- (Step 2) Contacted Local DVBE Organization(s) and listed the contact and results – if a DVBE search was conducted online, included a screen print with bid
- (Step 3) Advertised – IF NOT WAIVED IN THE SOLICITATION
 - Listed full information for the advertisement(s) and publication(s)
 - At least 2 ads (one in a trade publication and one in a DVBE focus publication); **OR** 1 ad in one approved dual-purpose publication (for approved publications, see the Resource Packet at www.dgs.ca.gov/smbus)
 - Attached a copy of the advertisement(s) and affidavit(s) of publication
 - The advertisements were published at least 14 days prior to the bid due date (or lesser time as specified)
 - The advertisements included required contact information
- (Step 4) Listed on STD. 840 all DVBEs contacted that were not selected to perform as subcontractors
 - Attached copies of the invitations sent to DVBEs
 - Invitations included the required contact information
 - Attached copies of the delivery confirmations for invitations to DVBEs (e.g. mail receipts, fax confirmations, etc.)
- (Step 5) Listed the business reasons for non-selection of DVBEs contacted

OPTION C: BUSINESS UTILIZATION PLAN (BUP)

- Prior to the bid due date** – Submitted a BUP to DGS-PD and received approval
 - STD. 840 included with bid
 - Designated the BUP Option in Section A – Checked the third box of the form STD. 840
 - Attached a copy of the BUP Approval letter from DGS-PD
 - Bidder Declaration form GSPD-05-105 completed and included with bid
-

Office of Public School Construction

1130 K Street, Suite 400
Sacramento, CA 95814

Phone Number
(916) 445-3160

Fax Number
(916) 445-5526

OPSC Internet Page
<http://www.dgs.ca.gov/opsc>

3990
TECHNICAL SPECIFICATIONS

DIVISION	SECTION	TITLE	NO. OF PAGES
1		GENERAL REQUIREMENTS	
	01010	General Requirements	4
	01045	Cutting and Patching	3
	01300	Submittals	4
	01410	Testing Laboratory Services	2
	01630	Substitutions	4
2		SITWORK	
	02070	Selective Demolition	2
	02110	Clearing and Grubbing	3
	02200	Earthwork	8
	02450	Sitework Concrete	8
	02513	Asphalt Concrete Paving	3
	02820	Metal Fabrications	2
3		CONCRETE	
	03100	Concrete Formwork	8
	03200	Steel Reinforcement	7
	03300	Cast-in-place Concrete	32
4		MASONRY	
	04220	Concrete Unit Masonry	26
5		METALS	
	05500	Miscellaneous Metals	9
	05810	Expansion Joint Cover Assemblies	4
6		WOOD AND PLASTICS	
	06101	Rough Carpentry	11
	06190	Prefabricated Wood "I" Joists	4
	06200	Finish Carpentry	5
7		THERMAL AND MOISTURE PROTECTION	
	07190	Under-slab Vapor Retarder	3
	07210	Building Insulation	2
	07270	Firestopping	4
	07312	Asphalt Shingles	4
	07600	Sheet Metal	5
	07900	Sealants and Caulkings	8

8		DOORS AND WINDOWS	
	08110	Steel Doors and Frames	6
	08710	Finish Hardware	6
9		FINISHES	
	09203	Exterior lathing	7
	09220	Portland Cement Plaster	6
	09250	Gypsum Board	8
	09665	Sheet Vinyl Flooring	5
	09900	Painting	14
10		SPECIALTIES	
	10265	Corner Guard Protection Systems	3
	10410	Architectural Letters and Signage	2
	10426	Disabled Access Identification Plaques	3
11		EQUIPMENT	
	11400	Food Service Equipment	9
15		MECHANICAL	
	15010	General Mechanical Provisions	7
	15400	Plumbing	11
	15650	Heating, Ventilating and Air Conditioning	14
16		MECHANICAL	
	16050	Basic Electrical Materials and Methods	12
	16060	Grounding and Bonding	5
	16120	Conductors and Cables	4
	16130	Raceways and Boxes	8
	16400	Service and Distribution	5

SECTION 01010

GENERAL REQUIREMENTS

1-01 CODES AND STANDARDS:

- A. Codes: All work shown on plan or described in Specifications shall comply with all Federal, State, local law, ordinances, codes, safety orders which relate to the health and safety of the construction workers and the building occupants, and which have jurisdiction in the building locality.
- B. Standards: Any material or operation specified by reference to the published specifications of a manufacturer, institute, association, governmental agency, or other published standards, shall comply with the requirements of the latest edition or printing in effect at the date of issue shown in the Documents unless other date is implied by the suffix number of the Standard.

1-02 UTILITIES:

- A. Unless otherwise agreed by the parties in writing, all utilities, including but not limited to electricity, gas, and telephone used on the Project, shall be furnished and paid for by Contractor. The Owner will make reasonable amounts of water available to the contractor at no cost.

1-03 SANITATION FACILITIES:

- A. Provide self-contained, single-occupant toilet units of the chemical or aerated recirculation type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material.

1-04 FIRST AID SUPPLIES:

- A. Comply with governing regulations.

1-05 CONSTRUCTION SCHEDULES:

- A. Within ten (10) calendar days after award of the Contract, the Contractor shall prepare and submit to the Architect a preliminary construction progress schedule for the work, with subschedules of related activities which are essential to its progress.
- B. Submit revised progress schedules at least monthly.
- C. Schedule shall be reviewed and approved by the Architect and the Owner. The level of detail and format of the schedule shall be as defined herein and to the satisfaction of the Owner.
- D. Approval of schedule shall not relieve the Contractor of his responsibility to supervise the work per the requirements of the General Conditions.
- E. Requests for contract time extensions must be substantiated by the Construction Schedule.
- F. Prepare schedules using a Critical Path method format.

1. Provide individual task assignments for each operation.
2. Horizontal time scale: Identify the first work day of each week.
3. Scale and spacing: To allow space for notations and future revisions.
4. Schedule shall be of sufficient size to be readily readable.

G. Construction Progress Schedule:

1. Show the complete sequence of construction by task.
2. Tasks shall include, but not be limited to:
 - a. Actual physical construction activities
 - b. Material deliveries (including lead time)
 - c. Submittals and shop drawings (preparation and review)
 - d. Inspections
 - e. Curing and drying time
3. Show dependencies between tasks, including lead and lag times.
4. Show task durations.
5. Indicate the critical path and critical tasks.
6. Show the dates for the beginning of each task.
7. Show anticipated dates for taking delivery of Owner furnished equipment.
8. The dates for Contractor's submittals.
9. The dates submittals will be required for Owner-furnished products.
10. The dates reviewed submittals will be required from the Architect.

H. Submit revised progress schedules showing changes occurring since previous submission of schedule:

1. Major changes in scope.
2. Activities modified since previous submission.
3. Revised projections of progress and completion.
4. Other identifiable changes.

I. With the revised progress schedule, provide a narrative report as needed to define:

1. Problem areas, anticipated delays, and the impact on the schedule.
2. Corrective action recommended and its effect.

J. Distribute copies of the reviewed schedules to:

1. Architect and Owner
2. Job site file
3. Subcontractors
4. Other concerned parties

1-06 SCHEDULES OF VALUES:

- A. Submit to the Architect a Schedule of Values allocated to the various portions of the Work, within ten days after award of contract.
- B. Upon request of the Architect support the values with data which will substantiate their correctness.

1-07 BARRIERS:

- A. Furnish, install and maintain suitable barriers as required to prevent public entry, and to protect the Work, existing facilities, remove when no longer needed, or at completion of Work.
- B. Seal work area in such a manner that the existing spaces will be protected from dust and debris created by the construction operation.

1-08 CLEANING:

- A. Execute cleaning, during progress of the Work, and at completion of the Work, as required by General Conditions.
- B. Execute periodic cleaning to keep the Work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.

1-09 PROJECT RECORD DOCUMENTS (AS-BUILT INFORMATION):

- A. Maintain at the site one record copy of:
 - 1. Drawings
 - 2. Specifications
 - 3. Addenda
 - 4. Change Orders and other Modifications to the Contract.
 - 5. Architect Field Orders or written instructions.
 - 6. Reviewed Shop Drawings, Product Data and Samples.
 - 7. Field test records.
- B. RECORDING:
 - 1. Record information concurrently with construction progress.
 - a. Do not conceal any work until required information is recorded.
 - 2. Drawings: Legible mark to record actual construction:
 - a. Depths of various elements of foundation in relation to finish first floor datum.
 - b. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - c. Field changes of dimension and detail.
 - d. At Contract close-out, deliver Record Documents to Architect.

1-10 OPERATING AND MAINTENANCE DATA:

- A. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under the Contract.
 - 1. Prepare operating and maintenance data as specified in this Section and as referenced in other pertinent sections of Specifications.
- B. Instruct Owner's personnel in the maintenance of products and in the operation of equipment and systems.

1-11 WARRANTIES AND BONDS:

- A. Assemble warranties executed by each of the respective manufacturers, suppliers, and subcontractors and deliver to Architect.

END OF SECTION

SECTION 01045

CUTTING AND PATCHING

PART 1: GENERAL

1-01 SUMMARY:

- A. This Section specified administrative and procedural requirements for cutting and patching.
- B. Related Sections:
 - 1. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.
 - 2. Refer to other sections for specific requirements and limitations applicable to cutting and patching individual parts of the work.

1-02 SUBMITTALS:

- A. Cutting and Patching Proposal: Submit a written proposal describing procedures for approval to Architect well in advance of executing cutting or alteration which affects:
 - 1. The work of the Owner or any separate contractor.
 - 2. The structural value or integrity of any element of the Project.
 - 3. The integrity or effectiveness of weather-exposed or moisture resistant elements or systems.
 - 4. The efficiency, operational life, maintenance or safety of operational elements.
 - 5. The visual qualities of sight-exposed elements.
- B. The Request shall Include:
 - 1. Identification of the Project:
 - 2. Description of the affected work.
 - 3. The necessity for cutting, alteration or excavation.
 - 4. The effect on the work of the Owner or any separate contractor, or on the structural or weatherproof integrity of the Project.
 - 5. Description of the proposed work:
 - a. The scope of cutting, patching, alteration, or excavation.
 - b. The trades who will execute the work.

- c. Products proposed to be used.
- d. The extent of refinishing to be done.
- 6. Alternatives to cutting and patching.
- 7. Cost proposal, when applicable.
- 8. Written permission of any separate contractor whose work will be affected.
- C. Should conditions of the work or the schedule indicate a change of products from the original installation, Contractor shall submit a request for substitution as provided for in the Contract Documents.
- D. Submit a written notice to Architect designating the date and the time the work will be uncovered.

PART 2: PRODUCTS

2-01 MATERIALS:

- A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.
- B. Comply with specifications and standards for each specific product involved.

PART 3: EXECUTION

3-01 INSPECTION:

- A. Inspect existing conditions of the Project, including elements subject to damage or to movement during cutting and patching.
- B. After uncovering work, inspect the conditions affecting the installation of Products, or performance of the Work.
- C. Report unsatisfactory or questionable conditions to the Architect in writing; do not proceed with the work until the Architect has provided further instructions.

3-02 PREPARATION:

- A. Provide adequate temporary support as necessary to assure the structural value or integrity of the affected portion of the work.
- B. Provide devices and methods to protect other portions of the project from damage.
- C. Provide protection from the elements for that portion of the project which may be exposed by cutting and patching work, and maintain excavations free from water.

3-03 PERFORMANCE:

- A. Execute cutting and demolition by methods which will prevent damage to other work, and will provide proper surfaces to receive installation of repairs.
- B. Execute excavating and backfilling by methods which will prevent settlement or damage to other work.
- C. Employ the original Installer or Fabricator to perform cutting and patching for:
 - 1. Weather-exposed or moisture-resistant elements.
 - 2. Sight-exposed finished surfaces.
- D. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finishes.
- E. Restore work which has been cut or removed; install new products to provide completed work in accordance with requirements of Contract Documents.
- F. Fit work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
- G. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:
 - 1. For continuous surfaces refinish to nearest intersection.
 - 2. For an assembly, refinish the entire unit.

3-04 CLEANING:

- A. Thoroughly clean areas and spaces where cutting and patching is performed.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1: GENERAL

1-01 SUMMARY:

- A. This Section specified administrative and procedural requirements for submittals required for performance of the work, including:
 - 1. Shop Drawings
 - 2. Product Data
 - 3. Samples

- B. Administrative Submittals: Refer to other division - 1 Sections and other contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:
 - 1. Applications for payment
 - 2. Performance and payment bonds
 - 3. Insurance certificates
 - 4. List of Subcontractors

- C. Related Documents:
 - 1. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division – 1 Specification Sections, apply to this Section.

1-02 SUBMITTAL PROCEDURES:

- A. Coordination: Coordination preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of perform of related construction activities to avoid delay.
 - 1. Coordinate each schedule with fabrication, purchasing, testing, deliver, other submittals and related activities that required sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related elements of the work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - a. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

- B. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for re-submittals.
 - 1. Allow two weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Architect will promptly advise the

Contractor when a submittal being processed must be delayed for coordination.

2. If an intermediate submittal is necessary, process the same as the initial submittal.
 3. Allow two weeks for reprocessing each submittal.
 4. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the work to permit processing.
- C. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
1. Provide a space approximately 4"x5" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
 2. Include the following information on the label for processing and recording action taken.
 - a. Project name
 - b. Date
 - c. Name and address of Architect
 - d. Name and address of Contractor
 - e. Name and address of subcontractor
 - f. Name and address of supplier
 - g. Name and address of supplier
 - h. Name of manufacturer
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate
- D. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Architect using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.
1. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

1-03 PRODUCT DATA:

- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where product data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."
1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
 - a. Manufacturer's printed recommendations.
 - b. Compliance with recognized trade association standards.
 - c. Compliance with recognized testing agency standards.

- d. Application of testing agency labels and seals.
- e. Notation of dimensions verified by field measurement.
- f. Notation of coordination requirements.

Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

- B. Submittals: Submit 5 copies of each required submittal. The Architect will retain two, project inspector one, Owner one, and one will be returned marked with action taken and corrections or modifications required.

Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

- C. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

- 1. Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.
- 2. Do not permit use of unmarked copies of Product Data in connection with construction.

1.06 SAMPLES:

- A. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

- 1. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximately limits of the variations.
- 2. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.

- B. Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.

- 1. Preliminary submittals will be reviewed and returned with the Architect's mark indicating selection and other action.

- C. Final Submittal: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets; one will be returned marked with the action taken.

- 1. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.

- a. Unless noncompliance with Contract Document provisions is observed, the

submittal may serve as the final submittal.

- b. Sample sets may be used to obtain final acceptance of the construction associated with each set.
- D. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.

1.07 ARCHITECT'S ACTION:

- A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each submittal, mark to indicate action taken, and return promptly.
- B. Compliance with specified characteristics is the Contractor's responsibility.

1.08 ACTION STAMP: The Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

- A. Reviewed: Where submittals are marked "reviewed", that part of the work covered by the submittal may proceed, provided it complies with requirements of the Contract Documents; final acceptance shall depend on that compliance.
- B. Furnish as Corrected: Where submittals are marked "Furnish as Corrected"; that part of the work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final acceptance shall depend on that compliance.
- C. Revise and Resubmit: Where submittal is marked "Revise and Resubmit", do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary obtain a different action mark.
- D. Rejected: When submittal is marked "Rejected", do not incorporate products into the work. Submit products as specified.
 - 1. Do not permit submittals marked "Rejected, Revise and Resubmit" to be used at the project site, or elsewhere where work is in progress.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 01410

TESTING LABORATORY SERVICES

PART 1: GENERAL

1-01 SUMMARY:

- A. Owner will employ and pay for services of an independent testing laboratory, approved by DSA, to perform specified inspection and testing.
- B. Employment of testing laboratory shall in no way relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

1-02 RESPONSIBILITIES:

- A. Contractor:
 - 1. Deliver to laboratory at designed location adequate samples of materials proposed to be used which require testing, together with proposed mix designs. Contractor shall be solely responsible for delays due to samples not being submitted in time to allow for testing and evaluation.
 - 2. Cooperate with laboratory personnel, and provide access to Work, and to manufacturer's facilities.
 - 3. Provide incidental labor and facilities to provide access to work to be tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, and for storage and curing of test samples.
 - 4. Notify Architect/Engineer and laboratory 24 hours prior to expected time for operations requiring inspection and testing services.
 - 5. Retesting: The Contractor is responsible for retesting where results of inspections, tests or similar services are unsatisfactory and do not comply with Contract Document requirements.
 - a. Cost of retesting failed materials, construction revised or replaced by the contractor is the responsibility of the contractor.
 - 6. Scheduling times for taking tests, inspections taking samples and similar activities.
 - 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 Inspector's time will be used to full advantage. If inspection costs become excessive because of poor procedures, such excess costs will be paid for by the Owner, but deducted from the Contract Price.
- B. Owner:
 - 1. Provide testing and inspection services to be performed by an independent agency.

- a. The Owner will employ and pay for the services of an independent agency, testing laboratory or other qualified firm to perform services which are the Owner's responsibility.

C. Testing Agency:

1. All materials, samples, test, and inspections shall be in accordance with the requirements of the specifications.
2. All sampling and tests shall be made by a properly qualified person or testing laboratory, who shall furnish the Architect, the Owner, and the Division of the State Architect with reports certified in the presence of a Notary Public, showing the results of tests and stating that they were made in accordance with the specified provisions. All tests as well as sampling and preparation of samples shall be in accordance with the Standards as latest adopted by the ASTM.
3. When materials fail to meet the requirements of the specifications, attention shall be called to the deviations on the laboratory report.
4. Limits on Authority:
 - a. Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - b. Laboratory may not approve or accept any portion of the Work.
 - c. Laboratory may not assume any duties of Contractor.
 - d. Laboratory has no authority to stop Work.

PART 2: PRODUCTS (Not Applicable)

PART 3: EXECUTION

3-01 GENERAL:

- A. Upon completion of inspection, testing, sample-taking repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Section 01045, contract requirements for Cutting and Patching.
- B. Repair and protection is the Contractors responsibility, regardless of the assignment of responsibility for inspection, testing and similar services.

END OF SECTION

SECTION 01630
SUBSTITUTIONS

PART 1: GENERAL

1-01 SUMMARY:

A. Section Includes:

1. Procedures for requesting substitutions of unlisted products in lieu of products named in specifications.

B. Related Sections:

1. Section 01300 - Submittals

1-02 DEFINITIONS:

A. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions". The following are not considered substitutions:

1. Revisions to Contract Documents requested by the Owner or Architect.
2. Specified options of products and construction methods included in the Contract Documents
3. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1-03 SUBMITTALS:

A. Substitution Request Submittal: Requests for substitution will be considered if received within 35 days after commencement of the Work. Requests received more than 35 days after commencement of the Work may be considered or rejected at the discretion of the Architect.

1. Complete the attached Substitution Request form substantiating compliance of proposed substitution with Contract Documents.
2. Submit 3 copies of each request for substitution for consideration.
3. Identify the product, or the fabrication or installation method to be replaced in each request. Include related specification section and drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
 - a. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
 - b. Samples, where applicable.

- c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
 - d. Coordination information, including a list of changes or modifications needed to other parts of the work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.
 - e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
 - f. Cost information, including a proposal of the net change, if any in the Contract Sum.
 - g. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time, that may subsequently become necessary because of the failure of the substitution to perform adequately.
- B. Architect's Action: Within one week of receipt of the request for substitution, the Architect will request additional information or documentation necessary for evaluation of the request. Within 2 weeks of receipt of the request, or one week of receipt of the additional information or documentation, which ever is later, the Architect will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name. Acceptance will be in the form of a Change Order.

PART 2 - PRODUCTS

2-01 SUBSTITUTIONS:

- A. Conditions: The Contractor's substitution request will be received and considered by the Architect when one or more of the following conditions are satisfied, as determined by the Architect; otherwise requests will be returned without action except to record noncompliance with these requirements.
- 1. Extensive revisions to Contract Documents are not required.
 - 2. Proposed changes are in keeping with the general intent of Contract Documents.
 - 3. The request is timely, fully documented and properly submitted.
 - 4. The request is directly related to an "or equal" clause or similar language in the Contract Documents.
 - 5. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the work promptly or coordinate activities properly.
 - 6. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.

7. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.
 8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
 9. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution provide the required warranty.
- B. The Contractor's submittal and Architect's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.
- C. Any substitutions which modify and /or affect the structural safety, fire life safety or access compliance shall be submitted and approved by DSA.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SUBSTITUTION REQUEST

TO: Integrated Designs by SOMAM, Inc.
6011 N. Fresno Street, Suite 130
Fresno, California 93710

PROJECT: _____

SPECIFIED ITEM:

Section	Page	Paragraph	Description
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The undersigned requests consideration of the following:

PROPOSED SUBSTITUTION:

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation fit the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The undersigned certifies that the following paragraphs, unless modified by attachments, are correct:

1. The proposed substitution does not affect dimensions shown on drawings.
2. The undersigned will pay for changes to the building design, including engineering design, detailing, and construction costs caused by the requested substitution, including unforeseen conditions that are not apparent at the time of approval.
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.

The undersigned further states that the function, appearance, and quality of the proposed substitution are equivalent or superior to the specified item.

Submitted by:

Signature: _____

Firm: _____

Address: _____

Date: _____

Telephone _____

Attachments _____

For use by the Design Consultant

Approved Approved as Noted

Not Approved Rejected

By: _____

Date: _____

Remarks: _____

SECTION 02070

SELECTIVE DEMOLITION

PART 1: GENERAL

1-01 SUMMARY:

- A. Section Includes: Removal and disposal off-site of the following items noted for demolition on the drawings.
 - 1. Windows
 - 2. Doors

1-02 JOB CONDITIONS:

- A. Salvaged Materials: Items of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.
 - 1. Storage or sale of removed items will not be permitted on site.
- B. Explosives: Use of explosives is not permitted.
- C. Protection: Ensure safe passage of persons around area of demolition. Conduct operations to prevent damage to adjacent buildings, structures, and other facilities and injury to persons.
 - 1. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structures to be demolished and adjacent facilities to remain.
- D. Damages: Promptly repair damages caused to adjacent facilities by demolition operations.
- E. Utility Services: Maintain existing utilities and protect against damage during demolition operations.
 - 1. Do not interrupt existing utilities serving occupied or used facilities, except when authorized by the Architect. Provide temporary services during interruptions to existing utilities, as acceptable to the Architect.
 - 2. Disconnecting and sealing indicated utilities before starting demolition operations is part of this work.

PART 2: PRODUCTS

2-01 EQUIPMENT:

- A. Provide all equipment as may be necessary to accomplish the work specified herein or as required by the Drawings.
- B. Utilize bracing and shoring where necessary to prevent collapse of structure or parts thereof.

PART 3: EXECUTION

3-01 PREPARATION:

- A. General: Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.
 - 1. Cease operations and notify Architect immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
- B. Locate, identify, stub off, and disconnect utility services that are not indicated to remain.

3-02 DEMOLITION:

- A. General: Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on drawings.
 - 1. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.
- B. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Architect in written, accurate detail. Pending receipt of directive from Architect, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

3-03 SALVAGED MATERIALS:

- A. Salvaged Items: Where indicated on drawings as "Salvage - deliver to Owner," carefully remove indicated items, clean, store, and turn over to Owner and obtain receipt.

3-04 DISPOSAL OF DEMOLISHED MATERIALS:

- A. Remove from building site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose off site.
 - 1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
 - 2. Burning of removed materials is not permitted on project site.

END OF SECTION

SECTION 02110

CLEARING AND GRUBBING

PART 1: GENERAL

1-01 DESCRIPTION:

- A. Included: Work includes, but is not limited to, removal of A.C. paving, concrete, turf, trees and stumps, irrigation system, storm drain system, trimming and protection of trees which are to remain, and all similar work as specified herein and as required to provide a clear site.
- B. Related Work in Other Sections:
 - 1. Earthwork

1-02 QUALITY ASSURANCE:

- A. Qualifications of Workmen: Use workmen who are thoroughly trained and experienced in clearing/grubbing operations and tree trimming and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1-03 REGULATIONS AND STANDARDS:

- A. Comply with the rules and regulations of the California State Division of Industrial Safety and all other local, state, and federal agencies having jurisdiction. Nothing herein shall be construed as permitting work that is contrary to such rules, regulations and codes.
- B. All work on public property shall conform to applicable rules of the public entity having jurisdiction.

1-04 PROTECTION:

- A. Use all means necessary to protect all bench marks, monuments and other reference points. If disturbed or destroyed, restore or replace as required under the direction of a registered civil engineer or licensed land surveyor.

PART 2: PRODUCTS

2-01 MATERIALS AND EQUIPMENT:

- A. Materials and equipment not specifically indicated but required for the proper execution of the work of this section shall be as selected by the Contractor subject to review by the Architect.

PART 3: EXECUTION

3-01 INSPECTION:

- A. Examine the conditions under which work of this Section is to be performed. Contractor shall be held to have examined the site and familiarized himself as to actual conditions under which the work of this Section is to be performed.

3-02 CLEARING AND GRUBBING:

- A. Clearing: Remove all vegetation, shrubs, trees (except trees specifically identified to remain), debris, organic and other deleterious matter which is not suitable for fill or support of structural loads or slabs.
- B. Walks, Slabs, Curbs, Paving: Remove completely, including base aggregate and asphalt concrete.
- C. Piping and Electrical Conduit: Cap all lines which are abandoned. Coordinate removal and capping with utility companies.
- D. Tree Removal: Remove trees not otherwise designated to remain. Cut trees to be removed at or below the original grade.
- E. Stumps/Roots: Remove stumps completely. Within ten feet of footings, slabs or pavements, remove roots larger than one inch diameter, and remove matted root systems to three feet below foundations, slabs or pavements. Outside foundation slabs and pavements, remove to three feet below finish grade.
- F. Stubble: Strip stubble, grass and similar vegetation completely from building areas and areas to be paved.
- G. Depressions and Cavities: Unless further excavation is required, depressions or cavities resulting from grubbing shall be filled and compacted in accordance with the fill and compaction requirements specified in Section 02200, EARTHWORK, and in a manner that the surface conforms to the contour of the adjacent area.

3-03 TREES TO REMAIN:

- A. Protect all trees designated to remain, using barriers where appropriate. Maintain existing topsoil over the root systems. Remove all protective barriers when no longer required.
- B. Where any trees are damaged, or where limbs are required to be trimmed or removed because of operations under this Contract, or because of interference with new construction, any cutting or removal of limbs or branches shall be done only by qualified professional tree trimmers and in accordance with acceptable industry standards. Where major cutting or removal is required, it shall be reviewed by the Architect.
- C. Stockpiles of excavated material or topsoil shall be placed so that the stockpile will not slough off onto the root system of trees which are to remain.
- D. Temporary buildings, structures, automobiles and mechanical equipment shall not be parked or located within the drip line of any trees.
- E. Solvents, oils, and other materials which may be harmful to plant life shall be disposed of in containers and removed from the site. At the completion of the work, any contaminated soil shall be removed and replaced with topsoil at no further expense to the Owner.

3-04 DUST CONTROL:

- A. Use all means necessary to control dust caused by the work of this Section; thoroughly moisten all

surfaces as required to prevent dust being a nuisance to the public; neighbors and concurrent performance of other work on the site.

3-05 REMOVAL AND DISPOSAL:

- A. Lawfully dispose of all concrete, paving, base aggregate and similar substances off the site.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1: GENERAL

1-01 DESCRIPTION:

- A. Work Included: Excavating, filling, and grading for this work includes but is not necessarily limited to:
 - 1. Grading, compaction and preparation for foundations.
 - 2. Grading, including rough grading at areas to receive asphalt or concrete paving.
- B. Related Work Described Elsewhere:
 - 1. Sitework Concrete
 - 2. Asphalt Concrete Paving

1-02 QUALITY ASSURANCE:

- A. Standards: Comply with the following standards:
 - 1. State of California, Business and Transportation Agency, Department of Transportation, STANDARD SPECIFICATIONS, LATEST EDITION.
 - 2. California Building Standards Commission (CBSC):
 - California Building Code 2010 Edition (CBC).
 - California Building Code Standards 2010 Edition (CBC STD)
 - 3. American Society for Testing and Materials (ASTM).

C33-86	Concrete Aggregates
C94-86b	Standard Specifications for Ready Mixed Aggregates
D1556-84	Density of Soil in Place by the Sand Cone Method.
D1557-78	Test for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18 inch drop.
D2922-81	Density of Soil and Soil-Aggregate Mixtures in Place by Nuclear Methods (Shallow Depth)
D2937-71(1976)	Density of Soil in Place by the Drive Cylinder Method.

4. Title 24, Part 2, California Building Code
- B. All work shall comply with the rules and regulations of the Division of Industrial Safety and all other local and state and federal agencies having jurisdiction. Nothing contained herein shall be construed as permitting work that is contrary to such rules, regulations and codes.
- C. All work on public property shall conform to applicable rules and regulations of the public entity.

1-03 SUBMITTALS:

- A. General: Comply with pertinent provisions of Section 01300.
- B. Submit all test reports for compaction.

1-04 EXISTING CONDITIONS:

- A. Contractor shall be held to have visited the site prior to submitting proposal to determine existing conditions, nature of materials to be encountered and to evaluate other information concerning or affecting the work to be performed under the contract.

1-05 DUST CONTROL:

- A. Use all means necessary to control dust on and near the work and on and near all off-site borrow areas if such dust is caused by the Contractor's operations during performance of the work or if resulting from the condition in which the Contractor leaves the site.
- B. Thoroughly moisten all surfaces as required to prevent dust being a nuisance to the public, neighbors, and concurrent performance of other work on the site.

1-06 PROTECTIVE MEASURES:

- A. Maintain all bench marks, monuments, and other reference points. If disturbed or destroyed, replace as directed.

PART 2: PRODUCTS

2-01 FILL MATERIAL, GENERAL:

- A. Approval: All fill material shall be subject to review by the Architect.

2-02 ON-SITE FILL MATERIAL:

- A. On-site native material which is free from organic matter and other deleterious substances is suitable for fill material.

2-03 IMPORTED FILL MATERIAL:

- A. All imported fill material shall be predominately non-expansive granular material meeting the

requirements of Para. 2-01 above and the following criteria:

1. Plasticity Index: Less than 15
 2. Percent Passing No. 4 sieve = 50 to 100%
 3. Percent Passing No. 200 sieve = 40% maximum
 4. Expansion Index (UBC STD 29-2) = less than 20
 5. Minimum R-value = 40 (for pavement areas only)
 6. Maximum aggregate size = 3"
 7. Maximum aggregate size in top 12" of fill = 2"
 8. Material shall be free of organics and debris
- B. The Contractor shall provide, at his own expense, sufficient import fill from off-site sources to obtain the finish grades shown on the drawings.
- C. Imported fill material shall be free of toxic contaminants.
- D. The contractor shall contact the Architect for review of proposed import fill materials for conformance with requirements noted above a minimum of 5 days prior to importing to site.

2-04 OTHER MATERIALS:

- A. All other materials, not specifically described but required for a complete and proper installation, shall be as selected by the Contractor subject to the review by the Architect.

2-05 EQUIPMENT:

- A. Equipment shall be of the type and size appropriate for accomplishing the work.

PART 3: EXECUTION

3-01 SITE AND SUBGRADE PREPARATION:

- A. Stripping: The site shall be stripped of all existing concrete paving and aggregate base. Soil shall be stripped a minimum of 4" or until all organics in excess of 3 percent by volume are removed. Stripped material will not be suitable as engineered fill. Stripped topsoil shall be stockpiled and reused in landscape or non-structural areas.
- B. Over Excavation: The exposed subgrade within building, exterior flatwork and pavement areas shall be excavated/scarified to a minimum depth of 12 inches, worked until uniform and free from large clods, moisture-conditioned to a minimum of 2 percent above optimum moisture content, and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. Limits of recompaction shall extend 5 feet beyond structural elements.
- C. Proof – rolling: Areas of cut and areas which are to support buildings, slabs, footings and pavement shall be proof rolled with a minimum of three passes of heavy pneumatic tire compaction equipment. Soft soil zones observed during proof rolling shall be removed and replaced by import fill.

3-02 EXCESS WATER CONTROL:

- A. Unfavorable Weather: Do not place, spread, or roll fill material during unfavorable weather conditions. Do not resume operations until moisture content and fill density are satisfactory to the Architect.

- B. Flooding: Provide berms or channels to prevent flooding of subgrade. Promptly remove all water collecting in depressions.
- C. Softened Subgrade: Where soil has been softened or eroded by flooding or placement during unfavorable weather, remove all damaged areas and recompact as specified for fill and compaction below.
- D. Dewatering:
 - 1. Provide and maintain at all times during construction, ample means and devices with which to remove promptly and dispose of all water from every source entering the excavations or other parts of the work.
 - 2. Dewater by means which will ensure dry excavations and the preservation of the final lines and grades of bottoms of excavations.

3-03 TRENCHING:

- A. General: Perform all trenching required for the installation of items where the trenching is not specifically described in other Sections of these Specifications.
- B. Make all trenches open vertical construction with sufficient width to provide free working space at both sides of the trench and around the installed item as required for caulking, joining, backfilling and compacting. Trench width shall be a minimum of four (4) inches wider than the pipe or conduit and a maximum of twelve (12) inches wider than the pipe or conduit.
- C. Depth: Trench as required to provide the elevations shown on the Drawings. Where elevations are not shown on the Drawings, trench to sufficient depth to give a minimum of 18 inches of fill above the top of the pipe, measured from the adjacent finished grade.
- D. Correction of Faulty Grades: Where trench excavation is inadvertently carried below proper elevations, backfill with imported cohesionless material, and then compact to provide a firm and unyielding subgrade and/or foundation to the satisfaction of the Architect and at no additional cost to the Owner.
- E. Trench Bracing:
 - 1. Properly support all trenches in strict accordance with all pertinent rules and regulations.
 - 2. Brace, sheet, and support trench walls in such a manner that they will be safe and that the ground alongside the excavation will not slide or settle, and that all existing improvements of every kind, whether on public or private property, will be fully protected from damage.
 - 3. In the event of damage to such improvements, immediately make all repairs and replacements necessary and at no additional cost to the Owner.
 - 4. Arrange bracing, sheeting, and shoring so as to not place stress on any portion of the completed work until the general construction thereof has proceeded far enough to provide sufficient strength.
- F. Removal of Trench Bracing: Exercise care in the drawing and removal of sheeting, shoring, bracing,

and timbering to prevent collapse and caving of the excavation faces being supported.

- G. Grading and Stockpiling Trenched Material: Control the stockpiling of trenched material in a manner to prevent water running into the excavations. Do not obstruct surface drainage, but provide means whereby storm and waste waters are diverted into existing gutters, other surface drains or temporary drains. Maintain a two foot clearance between the trench and the toe of the slope of excavated materials. Maintain access to hydrant and valves.
- H. Open Trenches: Do not excavate more than 200 feet in advance of pipe laying. Backfill within 24 hours after placing pipe. Backfill trenches in roadways before leaving project site each day.

3-04 FILL AND COMPACTION:

- A. Filling: After subgrade compaction has been reviewed by the Geotechnical Engineer, spread approved fill materials in layers approximately six inches in uncompacted thickness.
- B. Moisture-conditioning: Water or aerate the fill material as necessary, and thoroughly mix to obtain a moisture content to within 2 percent of optimum which will permit proper compaction.
- C. Compaction, general: Compact and test each soil layer to at least the specified minimum degree. Repeat compaction process until plan grade is attained. Do not place successive layers until the previous layer is satisfactorily compacted.
 - 1. Degree of Compaction: Is the ratio, expressed as a percentage, of the dry density of the fill material as compacted in the field and measured by in-place density test, to the maximum dry density of the same material determined by ASTM Standard D-1557.
- D. Degree of Compaction Requirements:
 - 1. Structural fill: Densify all on-site or import structural fill (also designated as "engineered fill"), including recompacted native soils and backfill, and scarified areas to a minimum degree of compaction of 90%.
 - 2. Pavement and Slab Areas: Compact the upper eight inches of fill or cut in pavement and slab areas to a minimum degree of compaction of 90%.
 - 3. Trenches in building, foundation, slab, and pavement areas:
 - a. Building, slab and pavement areas are defined, for the purpose of this paragraph, as extending a minimum of five feet beyond the building, foundation slab and/or pavement perimeter.
 - b. Compact backfill material to a minimum degree of compaction of 90%.
 - c. Compact the upper eight inches of backfill in pavement and slab areas to a minimum degree of compaction of 90%.
 - 4. Trenches outside building, foundation, slab, and pavement areas:
 - a. Compact backfill to a minimum degree of compaction of 85%, except the upper 2.0 feet shall be compacted to at least a minimum degree of compaction of 90%.

- E. Backfill for Structures:
 - 1. Backfill against concrete or masonry structures shall not be started until such structures have reached their required compressive strengths.
 - 2. Heavy equipment for spreading and compacting backfill shall not be operated closer to foundation or retaining walls than a distance equal to the final depth of the backfill adjacent to the wall. The area remaining shall be compacted by power-driven hand tampers suitable for the material being compacted.
 - 3. As far as practicable, backfill shall be brought up evenly on each side of the wall.
- F. Jetting will not be permitted unless specifically authorized by the Geotechnical Engineer for densification of cohesionless material.

3-05 FOUNDATION FOR PIPES:

- A. General: Grade the trench bottoms to provide a smooth, firm, and stable foundation free from rock points throughout the length of the pipe.
- B. Foundation Material: Place a minimum of four inches of imported cohesionless material in the bottom of the trench.
- C. Subsurface Conditions:
 - 1. In areas where soft, unstable materials are encountered at the surface upon which cohesionless material is to be placed, remove the unstable material and replace it with material approved by the Geotechnical Engineer. Make sufficient depth to develop a firm foundation for the item being installed.
 - 2. If the need for such overexcavation has been occasioned by an act or failure to act on the part of the Contractor, make the overexcavation and replacement at no additional cost to the Owner.
- D. Shaping:
 - 1. At each joint in pipe, recess the bottom of the trench as required into the firm foundation in such a manner as to relieve the bell of the pipe of all load and to ensure continuous bearing of the pipe barrel on the firm foundation.
 - 2. Accurately shape all pipe subgrade and fit the bottom of the trench to the pipe shape. Use a drag template shaped to conform to the outer surface of the pipe if other methods do not produce satisfactory results.

3-06 BEDDING FOR PIPES:

- A. General: Place imported cohesionless material or lean concrete in the trench, simultaneously on each side of the pipe for the full width of the trench, to a maximum depth of three feet and a minimum depth of six inches above the outside diameter of the pipe barrel.
- B. Densification:

1. Densify the bedding material after placing by thoroughly saturating with water and vibrating with jetting equipment and a concrete vibrator stinger, at maximum intervals of two feet along both sides of the pipe.
 2. Take special care to provide firm bedding support on the underside of the pipe and fittings for the full length of the pipe.
- C. Alternate Bedding: Other bedding procedures and materials may be used if reviewed by the Engineer.

3-07 BACKFILL FOR PIPES:

- A. Using On-Site Materials: After the pipe has been thoroughly bedded and covered, spread the backfill material in uniform lifts of not more than eight inches in uncompacted thickness, and then compact as specified in this Section. Repeat the spreading and compacting procedure until adjacent grade level is attained. Material obtained from the trench excavation may be used provided that organic materials, debris and stones and lumps larger than 3 inches are removed.
- B. Using Lean Concrete Material: After the pipe has been thoroughly bedded and covered, fill the remaining portion of the trench to within 6 inches of finish grade. Mechanically vibrate. Place in accordance with California Standard Specification 19-3.062.
- C. Topsoil: Excavate and stockpile topsoil separately. Replace as surface backfill at least 6 inches thickness in landscape areas.

3-08 GRADING:

- A. General: Except as otherwise authorized by the Geotechnical Engineer, perform all rough and finish grading required to attain the elevations shown on the Drawings.
- B. Grading Tolerances: Plus or minus 0.1 foot
- C. Treatment After Completion of Grading:
 1. After grading is completed and the Architect has finished his observation, permit no further excavating, filling, or grading except with the review of the Geotechnical Engineer.
 2. Use all means necessary to prevent erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

3-09 FINISH ELEVATIONS AND LINES:

- A. For setting and establishing finish elevations and lines, secure and pay for the services of a civil engineer or land surveyor registered in California acceptable to the Architect. Carefully preserve all data and monuments set by the civil engineer and, if displaced or lost, immediately replace to the satisfaction of the Architect and at no additional cost to the Owner.

3-10 FIELD QUALITY CONTROL:

- A. Where fill, backfill, or in-place materials are required to be compacted to a specified density, the maximum density for control shall be determined in accordance with ASTM D1557. The results of these tests shall be the basis upon which satisfactory completion of work will be determined. Re-work

and re-compact any area that does not meet minimum density requirements.

- B. In-place density tests shall comply with ASTM D1556, D2922, or D2937.
- C. In-place moisture tests may comply with ASTM D3017.
- D. Sampling: Paved areas shall have a minimum of 2 tests each area of sidewalk, 4 random tests on subgrade within building area, one test per 50 lineal feet for trench backfill and shall be performed at such other times as necessary to document contract compliance. A record shall be maintained of the location of samples.
- E. One moisture-density test shall be made in accordance with ASTM D1557 for each type of material which requires in-place compaction determination.

END OF SECTION

SECTION 02450

SITework CONCRETE

PART 1: GENERAL

1-01 DESCRIPTION:

- A. Work Included: Provide all cast-in-place concrete for all sitework concrete including sidewalks, curbs, gutters, mowstrips and light fixture footings, complete, in place, as indicated on the Drawings, specified herein, and as required for a complete and proper installation.

1-02 QUALITY ASSURANCE:

- A. Codes and Standards:

- 1. Comply with applicable provisions of the following codes and standards:

- a. American Society for Testing and Materials (ASTM): The specifications and standards hereinafter referred to, are the latest editions, except when year is specified.

A615/A615M-01b	Standard Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
C94/C94M-00e2	Standard Specification for Ready- Mixed Concrete
C171-97a	Standard Specification for Sheet Materials for Curing Concrete
C173/C173M-01e1	Standard Method of Test for Air Content of Freshly Mixed Concrete by the Volumetric Method
C231-97e1	Air Content of Freshly Mixed Concrete by the Pressure Method
C309-98a	Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete
D1751-99	Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural construction (Non-extruding and Resilient Bituminous types).
D1752-84 (1996)e1	Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.

- b. American Association of State Highway and Transportation Officials (AASHTO) Publication:

M182 Burlap Cloth Made From jute or Kenaf
- c. Provisions of California Building Code, Title 24, Part 2 are applicable to the work. When requirements of such codes are at variance with requirements specified in foregoing paragraph, the provisions of California Code of Regulations shall take precedence.

B. Qualifications of Installer:

- 1. Throughout the progress of installation of the work of this Section, provide at least one person who shall be thoroughly familiar with the specified requirements, completely trained and experienced in the necessary skills, and who shall be present at the site and shall direct all work performed under this Section.
- 2. In actual installation of the work of this Section, use adequate numbers of skilled workmen to insure installation in strict accordance with the contract documents.
- 3. In acceptance or rejection of work performed under this Section, the Architect will make no allowance for lack of skill on the part of the workmen.

PART 2: PRODUCTS

2-01 MATERIALS:

- A. Concrete: Comply with Standard Specifications for Ready-Mixed Concrete, ASTM C94, Alternate No. 3, with the following requirements:
 - 1. 28 day compressive strength = 3000 psi
 - 2. Maximum slump = 4 inches
 - 3. Minimum Cement Content =7.1 sacks per cubic yard
 - 4. Maximum water cement ratio =6.0 gallons/sack
 - 5. Maximum aggregate size = 1.0 inch
 - 6. The concrete mixtures shall have air content by volume of concrete of 4 to 6 percent, based on measurements made immediately after discharge from the mixer. Air content shall be determined in accordance with ASTM C173 or ASTM C231. ASTM C231 shall be used with concretes and mortars made with relatively dense natural aggregates.
- B. Concrete Curing Materials:
 - 1. Burlap: AASHTO M182 having a weight of 14 ounces or more per square yard when dry.

2. Impervious Sheeting: ASTM C171.
 3. Liquid Membrane Curing Compound: ASTM C309, Type 2. Compound shall be an acrylic emulsion type and shall meet the California Air Regulation Board requirements.
- C. Joint Materials:
1. Expansion Joint Fillers: ASTM D1751 or ASTM D1752.
- D. Sidewalk Forms: Shall be of wood or steel, straight of sufficient strength to resist springing during depositing and consolidating concrete, and of a height equal to the full depth of the finished sidewalk. Wood forms shall be surfaced plank, 2- inch nominal thickness, straight and free from warp, twist, loose knots, splits or other defects. Wood forms shall have a nominal length of 10 feet, with a minimum of three stakes per form, at maximum spacing of 4 feet. Corners, deep sections, and radius bends shall have additional stakes and braces, as required. Radius bends may be formed with 3/4-inch boards, laminated to the required thickness. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points. Form ends shall be interlocked and self-aligning. Forms shall include flexible forms for radius forming, corner forms, form spreaders, and fillers. Forms shall have a nominal length of 10 feet, with a minimum of two welded stake pockets per form. Stake pins shall be solid steel rods with chamfered heads and pointed tips, designed for use with steel forms.
- E. Curb and Gutter Forms: Curb and gutter forms shall be of wood or steel, straight, and of sufficient strength to resist springing during depositing and consolidating the concrete. The outside forms shall have a height equal to the full depth of the curb or gutter. The inside form or curb shall have batter as indicated and shall be securely fastened to and supported by the outside form. Straight forms of wood shall be surfaced plank, 2-inch nominal thickness, straight and free from warp, twist, loose knots, splits, or other defects. Wood forms shall have a nominal length of 10 feet, with a minimum of three stakes per form, at maximum spacing of 4 feet. Corners, deep sections, and radius bends shall have additional stakes and braces, as required. Radius bends may be formed with 3/4-inch boards, laminated to the required thickness. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points. Form ends shall be interlocked and self-aligning. Forms shall include flexible forms for radius forming, corner forms, form spreaders, and fillers. Forms shall have a nominal length of 10 feet, with minimum of two welded stake pockets per form. Stake pins shall be solid steel rods with chamfered heads and pointed tips, designed for use with steel forms. Rigid forms shall be provided for curb returns, except that benders of thin plank forms may be used for curb or curb returns with a radius of 10 feet or more, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90 degrees cannot be used. Back forms for curb returns may be made of 1-1/2-inch benders, for the full height of the curb, cleated together.
- F. Reinforcing Steel: ASTM A615, Grade 60.

PART 3: EXECUTION

3-01 SUBGRADE PREPARATION:

- A. General: The subgrade shall be constructed true to grade and cross section.
- B. Sidewalk Subgrade: The subgrade shall be thoroughly wetted and then compacted with two passes of

a 500-pound roller to obtain a relative compaction of 95%. Yielding material deflecting more than 1/2 inch under the specified roller shall be removed to a depth of not less than 6 inches below subgrade elevation and replaced with an approved granular material. The material shall then be compacted as described above. The completed subgrade shall be tested for grade and cross section with a template extending the full width of the sidewalk and supported between side forms.

- C. Curb and Gutter Subgrade: The subgrade shall be of materials equal in bearing quality to the subgrade under the adjacent roadway and shall be placed and compacted to conform with applicable requirements of Section 02200, EARTHWORK. The subgrade shall be tested for grade and cross section by means of a template extending the full width of the curb and gutter.
- D. Maintenance of Subgrade: The subgrade shall be maintained in a smooth, compacted condition, in conformity with the required section and established grade until the concrete is placed. The subgrade shall be in a moist condition when concrete is placed. The subgrade shall be prepared and protected so as to produce a subgrade free from frost when the concrete is deposited.

3-02 FORM SETTING:

- A. Sidewalk: Forms for sidewalks shall be set with the upper edge true to line and grade and shall be held rigidly in place by stakes placed at intervals not to exceed 4 feet. After forms are set, grade and alignment shall be checked with a 10-foot straightedge. Forms shall conform to line and grade with an allowable tolerance of 1/8 inch in any 10-foot long section. Forms shall be coated with form oil each time before concrete is placed. Wood forms may, instead, be thoroughly wetted with water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory. Side forms shall not be removed for less than 12 hours after finishing has been completed.
- B. Curbs: Forms for curbs shall be carefully set to alignment and grade and to conform to the dimensions of the curb. Forms shall be held rigidly in place by the use of stakes placed at intervals not to exceed 4 feet. Clamps, spreaders, and braces shall be used where required to insure rigidity in the forms. The forms on the front of the curb shall be removed not less than 2 hours nor more than 6 hours after the concrete has been placed. Forms back of curb shall remain in place until the face and top of the curb have been finished as specified for concrete finishing. Gutter forms shall not be removed while the concrete is sufficiently plastic to slump in any direction. Forms shall be cleaned and coated with form oil each time before concrete is placed. Wood forms may, instead, be thoroughly wetted with water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory.

3-03 CONCRETE PLACEMENT AND FINISHING:

- A. Sidewalks:
 - 1. Placing: Concrete shall be placed in the forms in one layer of such thickness that when compacted and finished the sidewalk will be of the thickness indicated. After concrete has been placed in the forms, a strike-off guided by side forms shall be used to bring the surface to proper section to be compacted. The concrete shall be tamped and consolidated with a suitable wood or metal tamping bar, and the surface shall be finished to grade with a wood float. Finished surface of the walk shall not vary more than 3/16-inch from the testing edge of a 10 foot-straightedge, except at grade changes. Irregularities exceeding the above shall be satisfactorily corrected. The surface shall be divided into rectangular areas by means of contraction joints spaced at not more than 5 feet on centers.

2. Concrete Finishing: After straightedging, when most of the water sheen has disappeared, and just before the concrete hardens, the surface shall be finished to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. The final finish shall be a medium broom finish. Surfaces to be used by pedestrian traffic shall be broomed transversely to the line of traffic. Pedestrian ramps with slope exceeding 6% shall be given a non-slip finish by the application of an abrasive aggregate (Non-slip by Euclid Chemical or Fictex H or NS by Sonneborn, or equivalent) at not less than 25 lbs per 100 sq. ft. and finished with a heavy broom finish.
3. Edge and Joint Finishing: All slab edges, including those at formed joints, shall be finished carefully with an edger having a radius of 1/8-inch. Corner and edges which have crumbled and areas which lack sufficient mortar for proper finishing shall be cleaned and filled solidly with a properly proportioned mortar mixture and then finished.
4. Contraction Joints: The contraction joints shall be formed in the fresh concrete by cutting a groove in the top portion of the slab to a depth of at least one-fourth of the sidewalk slab thickness, using a jointer to cut the groove.
5. Expansion Joints: Transverse expansion joints shall be installed at sidewalk returns and opposite expansion joints in adjoining curbs. Where the sidewalk is not in contact with the curb, transverse expansion joints shall be installed as indicated or at intervals of not less than 30 or more than 50 feet. Transverse expansion joints shall be filled with 1/2-inch joint filler strips. Joint filler shall be placed with top edge 1/4-inch below the surface and shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing. Immediately after finishing operations are completed, joint edges shall be rounded with an edging tool having a radius of 1/8-inch, and concrete over the joint filler shall be removed. Expansion joints shall be formed about structures and features that project through or into the sidewalk pavement, using joint filler of the type, thickness, and width indicated. The filler shall be installed in such manner as to form a complete, uniform separation between the structure and sidewalk pavement. At the end of the curing period, expansion joints shall be carefully cleaned and filled with joint sealer. Concrete at the joint shall be surface dry, and the atmospheric and pavement temperatures shall be above 50°F at the time of application of joint-sealing materials. Joints shall be filled flush with the concrete surface in such manner as to minimize spilling on the walk surface. Spilled sealing material shall be removed immediately and the surface of the walk cleaned. Dummy groove joints shall not be sealed.
6. Surface Uniformity: The completed surface shall be uniform in color and free of surface blemishes and tool marks.

B. Curb and Gutter Concrete:

1. Placing: Concrete shall be placed in layers not to exceed 6 inches. Concrete shall be thoroughly consolidated by tamping and spading or with approved mechanical vibrators.
2. Concrete Finishing: The edges of the gutter and top of the curb shall be rounded with an edging tool to a radius of 1/2- inch and the surfaces shall be floated and finished with a smooth wood float until true to grade and section and uniform in texture. Floated surfaces shall then be brushed with a fine-hair brush with longitudinal strokes. Immediately after

removing the front curb form, the face of the curb shall be rubbed with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The surface, while still wet, shall be brushed in the same manner as the gutter and curb top. The top surface of gutter and entrance shall be finished to grade with a wood float. Except at grade changes or curves, finished surfaces shall not vary, from the testing edge of 10-foot straightedge, more than 1/8 inch for gutter and entrance and 1/4 inch for top and face of curb. Irregularities exceeding the above shall be satisfactorily corrected. Visible surfaces and edges of finished curb and gutter shall be free of blemishes and form and tool marks, and shall be uniform in color, shape, and appearance.

3. Joints. Expansion joints and contraction joints shall be constructed at right angles to the line of curb and gutter.
 - a. Contraction Joints: Contraction joints shall be constructed by means of 1/8-inch thick separators, of a section conforming to the cross section of the curb and gutter. Contraction joints shall be constructed directly opposite contraction joints in abutting portland-cement-concrete pavement. Where curb and gutter do not abut portland-cement-concrete pavements, contraction joints shall be so placed that monolithic sections between curb returns will not be less than 5 feet nor greater than 15 feet in length. Separators shall be removed as soon as practicable after concrete has set sufficiently to preserve the width and shape of the joint. Separators shall be removed prior to finishing.
 - b. Expansion Joints: Expansion joints shall be formed by means of preformed expansion-joint filler material cut and shaped to the cross section of curb and gutter. Expansion joints shall be provided in curb at the end of all returns. Expansion joints shall be provided in curb and gutter directly opposite expansion joints of abutting portland-cement-concrete pavement and shall be of the same type and thickness as joints in the pavement. Where curb and gutter do not abut Portland-cement-concrete pavement, expansion joints at least 1/2-inch in width shall be provided at intervals not exceeding 45 feet. Expansion joints shall be provided in non-reinforced concrete gutter at locations indicated.
4. Curb-Forming Machines: Curb-forming machines for constructing curb and gutter will be accepted based on trial use on the job. Use of the equipment shall be discontinued at any time during construction if the equipment produces unsatisfactory results, and the work shall be accomplished as specified above. Unsatisfactory work shall be removed and reconstructed for the full length between regularly scheduled joints. Removed portions shall be disposed of as directed.

3-04 CURING AND PROTECTION:

- A. Curing: Immediately after the finishing operations, exposed concrete surfaces shall be cured by one of the following methods as the Contractor may elect.
 1. Mat Method: The entire exposed surface shall be covered with two or more layers of burlap. Mats shall overlap each other at least 6 inches. The mat shall be thoroughly wetted with water prior to placing on concrete surface and shall be kept continuously in a saturated condition and in intimate contact with concrete for not less than 7 days.

2. Impervious Sheeting Method: The entire exposed surface shall be wetted with a fine spray of water and then covered with impervious sheeting material. Sheets shall be laid directly on the concrete surface with the light-colored side up and overlapped 12 inches when a continuous sheet is not used. the curing medium shall not be less than 18 inches wider than the concrete surface to be cured, and shall be securely weighted down by heavy wood planks, or by placing a bank of moist earth along edges and laps in the sheets. Sheets shall be satisfactorily repaired or replaced if torn or otherwise damaged during curing. the curing medium shall remain on the concrete surface to be cured for not less than 7 days.

 3. Membrane-Curing Method: The entire exposed surface shall be covered with a membrane-forming curing compound. Where type 1 curing compound is used, the concrete surface shall be shaded from the direct rays of the sun during the curing period. Curing compound shall be applied in two coats by hand-operated pressure sprayers at a coverage of approximately 300 square feet per gallon for each coat. The second coat shall be applied in a direction approximately at right angles to the direction of application of the first coat. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. Apply an additional coat to all surfaces showing discontinuity, pinholes or other defects. Concrete surfaces that are subjected to heavy rainfall within 3 hours after curing compound has been applied shall be resprayed by the above method and at the above coverage at no additional cost to the Owner. Expansion-joint openings shall be sealed at the top by inserting moistened paper or fiber rope or covering with strips of waterproof paper prior to application of the curing compound, in a manner to prevent the curing compound entering the joint. Concrete surfaces to which membrane-curing compounds have been applied shall be adequately protected for 7 days from pedestrian and vehicular traffic and from any other action that might disrupt the continuity of the membrane. Any area covered with curing compound and damaged by subsequent construction operations within the 7-day curing period shall be resprayed as specified above at no additional expense to the Owner.
- B. Backfilling: After curing, debris shall be removed, and the area adjoining the sidewalk shall be backfilled, graded, and compacted to conform to the surrounding area in accordance with lines and grades indicated.
 - C. Protection: Completed sidewalk shall be protected from damage until accepted. The Contractor shall repair damaged concrete and clean concrete discolored during construction. Sidewalk that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

3-05 PAVEMENT MARKINGS FOR THE DISABLED:

- A. Painted lines and markings on pavement shall be 3" minimum wide, blue color equal to color no. 15090 per Fed. Standard 595B.
- B. Parking spaces shall be marked in accordance with CBC 1129B.5.
- C. Tactile warning lines shall conform to CBC 1133B.8.3 and 1133B.8.4.

3-06 ROCK POCKETS: Immediately upon stripping curb forms and prior to backfill all rock pockets or honeycombs shall be repaired to the satisfaction of the Architect.

3-07 CLEANING-UP: During the progress of the work as may be requested by the Architect and before acceptance and final payment, the Contractor shall remove all surplus earth and other surplus material from the site of the work and then complete the cleanup by sweeping or washing the work area and leave the whole area in a neat and finished condition within two weeks after the concrete work has been completed.

END OF SECTION

SECTION 02513

ASPHALT CONCRETE PAVING

PART 1: GENERAL

1-01 DESCRIPTION:

- A. Included: On-site asphaltic concrete paving required for this work is indicated on the drawings, and includes, but is not necessarily limited to final preparation of subgrade, soil sterilization under pavement, mineral aggregate base course, asphalt surfacing materials, placing asphaltic concrete, flood test, seal coat and pavement marking.

1-02 QUALITY ASSURANCE:

- A. Standard Requirements: Insofar as is consistent with project requirements, conform to applicable requirements of State of California, Business and Transportation Agency, Department of Transportation, STANDARD SPECIFICATIONS, LATEST EDITION.
- B. Qualifications of Workmen: Provide at least one person who shall be thoroughly trained and experienced in the skills required, and who shall be completely familiar with the design and application of work required by this section and who shall be present at all times during progress of the work of this section and shall direct all work performed under this section. For actual finishing of asphaltic concrete surfaces, and operation of the required equipment, use only personnel who are thoroughly trained and experienced in the skills required.

1-03 PRODUCT HANDLING:

- A. Protection: Use all means necessary to protect the materials of this section before, during and after installation, and to protect the work of other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the satisfaction of the Architect and at no additional cost to the Owner.

1-04 SUBMITTALS:

- A. Certificate of Compliance: Upon completion of all work, submit certificate signed by the material supplier attesting that the materials, sources, grading, etc. are as specified.
- B. Delivery Tags: Submit delivery tag for each shipment of material.

PART 2: PRODUCTS

2-01 SOURCE OF SUPPLY:

- A. Provide paving materials from sources generally acceptable to California Department of Transportation. Prior to commencing work furnish Architect written information as to source of supply.

2-02 MATERIALS:

A. Pavement:

1. Headers: 2" x 6" nominal foundation grade redwood, graded in accordance with Standard Grading Rules, California Redwood Association, current edition. Stakes of material equivalent to header material.
2. Nails: Hot dip galvanized, sufficient length to penetrate stakes and headers and to provide one-half inch clinch.
3. Aggregate Base: Class 2, 3/4" maximum, Section 26, Standard Specifications. (Minimum R-Value: 78)
4. Herbicide: Commercial chemical for weed control, registered by Environmental Protection Agency (EPA). Provide granular, liquid or wettable powder form.
5. Liquid Asphalt (for priming): MC-70 or RC-70 as defined in Section 93, Standard Specifications.
6. Surface Course: Type B Asphalt, 1/2" maximum Section 39, Standard Specifications. Viscosity grade AR8000 High Temperature and AR4000 Low Temperature, Section 92, Standard Specifications.

B. Seal Coat:

1. Asphalt Fog Sealer: All paved areas except play courts to be sealed with emulsified asphalt diluted with water per Section 94 of the Standard specifications, Type SS1.

C. Paint: Quick drying high visibility water soluble acrylic striping paint, Stripe-Master, Wikel Mfg. Company, or similar by Sherwin- Williams, J.E. Bauer, PPG or equivalent.

D. Other Materials: Materials not specifically indicated, but required for proper completion of the work shall be selected by the Contractor subject to review of the Architect.

PART 3: EXECUTION

3-01 CONSTRUCTION:

- A. Subgrade: When subgrade construction is not specified in Earthwork section, construct in accordance with Section 19, Standard Specifications.
- B. Headers: Install to required grades and secure in position to stakes, spaced not more than 4'-0" o.c., with two nails. Clinch nails.
- C. Aggregate Base: Spread and compact to uniform thickness in accordance with Section 26, Standard Specifications. The asphalt shall be compacted to a minimum of 95 percent of the maximum laboratory density, as determined by California Test Method 336.
- D. Herbicide: Apply after base aggregate has been brought to proper grade and compacted. Apply herbicide in accordance with manufacturer's published directions.

- E. Surface Course: Mixed, spread and compacted in accordance with Section 39, Standard Specifications. Maximum single lift thickness is to be 2-1/2".

3-02 FLOOD TEST:

- A. Prior to application of seal coat, perform a flood test. Perform the flooding by use of a water tank truck. If a depression is found where water ponds to a depth of more than 1/8", fill or otherwise correct to provide proper drainage. Feather and smooth the edges of fill so that the joint between fill and original surface is not apparent.

3-03 SEAL COAT: Do not commence application of seal coat for a period of two weeks after asphaltic concrete has been completed, unless otherwise directed by the Architect.

- A. Inspection: Examine the areas and conditions under which sealer is to be applied. Correct conditions detrimental to the timely and proper completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

- B. Preparation: Paved areas shall be thoroughly cleaned with brooms and power blowers used simultaneously.

- C. Application:

- 1. Vehicle Areas: Apply fog seal coat of the specified emulsion in accordance with Section 37, Standard Specifications, applying at a maximum rate of 0.08 gallons per square yard over the entire paved area. Carefully remove all fog seal from adjacent surfaces.
- 2. Apply sealer by six foot spread squeegee machines under continuous hydraulic pressure. Mixtures shall be continuously agitated. Trim edges of pavement by hand using squeegee blades.

- D. Pavement Markings:

- 1. Preparation: Thoroughly clean the areas where pavement markings will be applied.
- 2. Painting: Apply the painting in accordance with the manufacturer's published recommendations, using all means necessary to protect the painted surfaces until dry.
- 3. All pavement striping and messages, both in traffic areas and in playcourt areas shall receive a minimum of two (2) coats of paint.
- 4. Accessible Stalls:
 - a. Painted lines and markings on pavement shall be 3" & 4" minimum wide, blue color equal to color no. 15090 per Federal Standard 595 B and white, see plans.
 - b. Parking spaces be marked in accordance with CBC 1129B.5, see plans.
 - c. Tactile warning lines shall conform to CBC 1133.8.3 and 1133.8.4, see plans.

END OF SECTION

SECTION 02820

METAL FABRICATIONS

PART 1: GENERAL: All applicable portions of Division 1 – General requirements are to be considered as included with this section.

1-01 SCOPE:

- A. Provide all labor, materials and equipment required for the complete fabrication, erection and/or installation of all structural and miscellaneous metal work and related items. The principal items of work included in this section are:
 - 1. General assemblies of metal work heavier than ten gauge.
 - 2. Miscellaneous angles, straps, rods, bolts, bollards, fittings, and rebar built-in anchorage and fastening devices for attachment of miscellaneous metal work to other construction.
- B. Related work specified elsewhere:
 - 1. Finish painting.

1-02 PRODUCT DELIVERY:

- A. Delivery of materials: Miscellaneous metal items shall be fabricated and delivered in such sequence as to permit uninterrupted progress of the work. In particular, all sleeves, anchor bolts, inserts and related items which will be embedded in concrete shall be delivered in sufficient time to be placed before concrete is scheduled to be poured.

PART 2: PRODUCTS

2-01 MATERIALS:

- A. Miscellaneous steel: Shall conform to ASTM A36.
- B. Pipe: ASTM A 53.
- C. Arc welding electrodes: Shall conform to "Standard Specifications for Iron and Steel Arc-Welding Electrodes", ASTM A 233.
- D. Galvanizing shall be in accordance with ASTM Standard Specification A 123. Metal shall be galvanized after fabrication.
- E. Cast iron: ASTM A 48.
- F. Material not otherwise specified shall conform to applicable requirements of A.I.S.C. Specifications.

2-02 FABRICATION:

- A. Shop priming: Work of this section which does not require galvanizing, or is not to be embedded in concrete, shall be shop painted with one coat primer paint. Before painting, work shall be thoroughly cleaned. Paint shall be applied by brush or spray, and shall fill all joints and corners. After installation, all field bolts, rivets, welds and areas where paint has been rubbed off or abraded shall be touched with same type primer used in shop.
- B. Galvanizing: All embedded exterior items, all exposed exterior work, such as gratings, framing and other designated exposed items, and their fasteners and anchors, shall be galvanized as indicated on the drawings. After fabrication clean items thoroughly removing seals, rust, flux deposits, oil, dirt, other foreign matter, and perform hot dip galvanized, with work assembled in as large section as indicated, or as can be handled. Bolts, nuts, screws and fittings, for assembly of, or used in conjunction with galvanized items shall be galvanized or cadmium plated.

PART 3: EXECUTION

3-01 INSTALLATION:

- A. Fittings: Contractor shall be responsible for proper fitting of all members, and shall take such measurements at the job site that are necessary to establish and verify all dimensions upon which the work is contingent. Contractor shall be responsible for the proper installations of anchors and attachments in concrete and masonry work as required.
- B. Work shall conform to dimensions and details shown on the drawings and on the final shop drawings approved by the Engineer.
- C. Cutting and drilling: Perform cutting, drilling, punching required for accurate fitting and assembly or work. In addition, perform similar operations as required for attachment of work of other trades, provided that directions for such work are supplied prior to shop drawings approval.
- D. Welding: Use the "Standard Code for Arc and Gas Welding in Building Construction" as published by the American Welding Society as a guide to general procedure and for use for the qualification of welders.
- E. Specific items of work:
 - 1. Pipe sleeves through concrete footings or slabs and similar work, shall be standard weight, wrought iron, mild steel sleeves with not less than 1/2" space all around between the sleeve and pipe.
 - 2. Sleeves and grouting: Provide 26-gauge galvanized sleeves with one-fourth inch wide grout space for pipe railing posts set in concrete, unless otherwise indicated. Grout standards and like work with "Por-Rok" or approved equal nonshrink grout materials.
 - 3. Pipe bumper posts: Fabricate, galvanize and install as detailed.

END OF SECTION

SECTION 03100

CONCRETE FORMWORK

PART 1: GENERAL

1-01 DESCRIPTION:

- A. Work Included: Provide formwork in accordance with the provisions of this section for all concrete shown on the Drawings or required by other Sections of these Specifications.
- B. Related Work in Other Sections: The following items of associated work are included in other sections of these specifications:
 - 1. Section 02200 - Excavating, Filling, Backfilling, and Other Earthwork Operations
 - 2. Section 02450 - Sitework Concrete
 - 3. Section 03200 – Steel Reinforcement.
 - 4. Section 03300 - Cast-in-place Concrete
 - 5. Furnishing of anchor bolts and miscellaneous metal items to be embedded in concrete.

1-02 QUALITY ASSURANCE:

- A. Design of Formwork is the Contractor's responsibility.
- B. Standards: Comply with the following standards:
 - 1. American Concrete Institute (ACI):
ACI 347-04 Recommended Practice for Concrete Formwork
 - 2. California Building Standard Commission
California Building Code, (CBC) 2010 Edition
 - 3. West Coast Lumber Inspection Bureau (WCLIB):
Standard Grading Rules for West Coast Lumber, No. 17, 2004 Edition.
 - 4. U.S. Department of Commerce Product Standard
PS 1-95 Construction and Industrial Plywood
 - 5. Redwood Inspection service (RIS) Publication:
Standard Specifications for Grades of California Redwood Lumber, 1995 Edition.

6. American Society for Testing and Materials (ASTM):
 - C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 - A653 Sheet Steel, Zinc-Coated (Galvanized) by the Hot-Dip Process
7. Title 24, Part 2, California Building Code.

1-03 SUBMITTALS:

- A. General: Comply with pertinent provisions of Section 01300.
- B. Manufacturers' data: Submit manufacturers' data and installation instructions for proprietary materials including form coatings, ties and accessories, and manufactured form systems if used.

PART 2: PRODUCTS

2-01 FORM MATERIALS:

- A. Earth Forms: Use for footing only where soil is firm and stable and concrete will not be exposed. Where earth forms are used, cut excavations neat and accurate to size for placing concrete directly against the excavation.
- B. Forms for Unexposed Concrete:
 1. For concrete which will not be exposed in the finished work, and which are not otherwise scheduled or specified, use one of the following form materials:
 - a. 6" or 8" wide, 1" nominal thickness boards with shiplapped or tongue and groove edges conforming to WCLIB paragraph 118c for STANDARD grade Douglas Fir. Boards shall be S4S.
 - b. 5/8" minimum thickness plywood conforming to PS1 grade marked B-B Plyform Class I Exterior.
 2. For unexposed concrete below grade which is to receive membrane waterproofing use 5/8" minimum thickness plywood grade conforming to PS-1 grade marked B-B Plyform Class I Exterior.
- C. Forms for Exposed Surfaces:
 1. General: For concrete which will be exposed in the finished work, except where otherwise scheduled or specified, use 5/8" "B-B Plyform Class I Exterior" grade plywood conforming to PS1.
 2. Plywood for standard architectural finish, concrete surfaces to receive a "rubbed" finish, and surfaces to receive membrane waterproofing shall be "B-B Plyform Class I Exterior" grade.
 3. Plywood for smooth architectural finish shall be "HD Overlay Plyform Class I Exterior" grade.

- D. Round Column Forms: Prefabricated seamless fire forms.
- E. Dividers for Concrete Slabs: Nominal 2 x 4 inch in size, "Foundation Grade" redwood conforming to paragraph 319, RIS.
- F. Form Ties:
 - 4. Provide factory-fabricated, adjustable-length, removable or snapoff metal form ties, designed to prevent form deflection and to prevent spalling concrete surfaces upon removal.
 - 5. Provide ties so that portion remaining within concrete after removal of exterior parts is at least 1 1/2" from the outer concrete surface. Provide form ties which will not leave a hole larger than 1" diameter in the concrete surface.
- G. Forms Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces requiring bond or adhesion, not impede the wetting of surfaces to be cured with water or curing compounds.

2-02 DESIGN OF FORMWORK:

- A. General:
 - 1. Design, erect, support, brace, and maintain formwork so that it will safely support vertical and lateral loads that might be applied, until such loads that might be applied, until such loads can be supported by the concrete structure. The design and engineering of the formwork shall be the responsibility of the contractor.
 - 2. Carry vertical and lateral loads to ground by formwork system and in-place construction that has attained adequate strength for that purpose.
 - 3. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation, and position.
 - 4. Design forms to include assumed values of live load, dead load, wind load, seismic load, weight of moving equipment operated on formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, allowable stresses, lateral stability, and other factors pertinent to safety of structure during construction.
 - 5. Provide shore and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations using wedges or jacks or a combination thereof.
 - 6. Support form facing materials by structural members spaced sufficiently close to prevent objectionable deflection. Limit deflection of facing materials reflected in concrete surfaces exposed to view to 1/240 of the span.
 - 7. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities, and within allowable tolerance.
 - 8. Provide camber in formwork as required for anticipated deflections due to weight and pressures of fresh concrete and construction loads.

9. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.
- B. Tolerances and Variations: The Contractor shall set and maintain concrete forms to ensure that, after removal of the forms and prior to patching and finishing, no portion of the concrete work will exceed any of the tolerances specified. The Contractor shall be responsible for variations due to deflection, when the latter results from concrete quality or curing other than that which has been specified. The tolerances specified shall not be exceeded by any portion of any concrete surface; the specified variation for one element of the structure will not be applicable when it will permit another element of the structure to exceed its allowable variations. Except as otherwise specified herein, tolerances shall conform to ACI 347.
- C. Earth Forms: Side forms of footings may be omitted and concrete placed directly against excavation only when requested by the Contractor and reviewed by the Architect. When omission of forms is reviewed, provide additional concrete 1" on each side of the minimum design profiles and dimensions shown. Wood edge strips shall be provided at the top on each side of the excavation to secure reinforcing and to prevent soil from sloughing into the excavation. Earth forms shall be tamped firm and clean of all debris and loose material before depositing concrete.

PART 3: EXECUTION

3-01 SURFACE CONDITIONS:

- A. Examine the substrate and conditions under which work of this Section is to be performed, and correct unsatisfactory conditions which would prevent proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3-02 FORM CONSTRUCTION:

- A. General:
 1. Construct forms complying with ACI 347, to the exact sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, level, and plumb work in finish structures.
 2. Provide for openings, offsets, sinkages, keyways, recesses moldings, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features required. Use selected materials to obtain required finishes.
 3. Forms for openings, and construction which accommodates installation by other trades whose materials and products must be fabricated before the opportunity exists to verify the measurements of adjacent construction which affects such installations, shall be accurately sized and located as dimensioned on the drawings. In the event that deviation from the Drawing dimensions results in problems in the field, the Contractor shall be responsible for resolution of the conditions without additional expense to the Owner.
- B. Fabrication:
 1. Fabricate forms for easy removal without hammering or prying against concrete surfaces.

Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Kerf wood inserts for forming keyways, reglets, recesses, and the like to prevent swelling and assure ease of removal.

2. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Brace temporary closures and set tightly to temporary openings on forms in as inconspicuous locations as possible, consistent with design requirements. Form intersecting planes to provide true, clean cut corners.

C. Forms for Exposed Concrete:

1. Forms for architectural concrete shall be designed to produce the required finish or finishes. Deflection of facing materials between studs as well as deflection of studs and walers shall be limited to 0.0025 times the span or as otherwise specified. Forms shall be designed to permit easy removal. Prying against the face of the concrete shall not be allowed. Only wooden wedges shall be used.
2. Where natural plywood form finish, grout cleaned finish, smooth rubbed finish, scrubbed finish, or sand floated finish is required, forms shall be smooth (faced with plywood, liner sheets, or prefabricated panels) and true to line, in order that the surfaces produced will require little dressing to arrive at true surfaces. Where any as-cast finish is required, no dressing shall be permitted in the finishing operation.
3. Where as-cast surfaces, including natural plywood form finish, are specified, the panels of material against which concrete is cast shall be orderly in arrangement, with joints between panels planned in acceptable relation to openings, building corners, and other architectural features.
4. Where panels for as-cast surfaces are separated by recessed or otherwise emphasized joints, the structural design of the forms shall provide for locating form ties, where possible, within the joints so that patches of tie holes will not fall within the panel areas.
5. In addition to shop drawings normally required, fabricating drawings of forms for architectural concrete shall be submitted for acceptance showing the jointing of facing panels, the locations of form ties, and any necessary alignment bracing.
6. Forms shall not be reused if there is any evidence of surface wear and tear or defect which would impair the quality of the surface. Forms shall be thoroughly cleaned and properly coated before reused.
7. Formwork for architectural concrete shall be observed continuously while concrete is being placed to see that there are no deviations from desired elevation, alignment, plumbness, or camber. If, during construction, any weakness develops and the falsework shows any undue settlement or distortion, the work shall be stopped, the affected construction removed if permanently damaged, and the falsework strengthened.
8. All cracks and openings in formwork joints larger than 1/8" shall be filled with a crack filler.

D. Corner Treatment: Unless shown otherwise, form chamfers with 3/4" x 3/4" strips, accurately formed and surfaced to produce uniformly straight lines and tight edge joints on exposed concrete. Extend

terminal edges to required limit and miter chamfer strips at changes in direction.

- E. Provision for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Verify size and location of openings, recesses and chases with the trade requiring such items. Accurately place and securely support items to be built into forms.
- F. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before concrete is placed. Retighten forms immediately after concrete placement as required to eliminate mortar leaks.
- G. Screeds: Set screeds and establish levels for tops of concrete slabs and leveling for finish on slabs. Shape slabs to drain where required or as indicated on drawings.
- H. Screenshot Supports: For concrete over waterproof membranes and/or vapor-barrier membranes, use cradle, pad, or base type which will not puncture the membrane. Do not stake through membrane.
- I. Edge Forms and Screeds Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in the finished slab surface. Provide and secure units to support types of screeds required. Slope floors uniformly to drains and depress slabs at tile floors.

3-03 FORM COATINGS:

- A. Coat form contact surfaces with form-coating compound before reinforcement is placed. Do not allow excess form coating material to accumulate in the forms or to come into contact with surfaces which will be bonded to fresh concrete.

3-04 INSTALLATION OF EMBEDDED ITEMS:

- A. General: Set and build into the work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of the items to be attached thereto.
- B. Coordination: All contractors whose work is related to the concrete, or must be supported by it shall be given ample notice and opportunity to introduce and/or furnish embedded items before the concrete is placed.
- C. Anchorage: Expansion joint material, waterstops, and other embedded items shall be positioned accurately and supported against displacement, prior to placing concrete. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids.
- D. Anchor Bolts: Anchor bolts shall be set to templates, shall be plumbed carefully and checked for location and elevation with an instrument, and shall be held in position rigidly to prevent displacement before concrete is placed.

3-05 REMOVAL OF FORMS:

- A. General:
 - 1. When repair of surface defects or finishing is required at an early age, forms shall be

removed as soon as the concrete has hardened sufficiently to resist damage from removal operations.

2. Top forms on sloping surfaces of concrete shall be removed as soon as the concrete has attained sufficient stiffness to prevent sagging. Any needed repairs or treatment required on such sloping surfaces shall be performed at once and be followed by the specified curing.
3. Wood forms for wall openings shall be loosened as soon as this can be accomplished without damage to the concrete.
4. Formwork for columns, walls, sides of beams, sides of slabs on grade and other parts not supporting the weight of the concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations.
5. Forms and shoring in the formwork used to support the weight of concrete in beams, slabs, and other structural members shall remain in place until the concrete has reached the specified 28 day compressive strength.

B. Removal Strength:

1. Although forms may be removed as specified above, members may be loaded only after the minimum design strengths as specified on the drawings are attained. Any request for earlier removal of forms and shoring shall be made to the Architect in writing, along with supporting evidence that the safety of the structure will not be impaired.
2. When removal of formwork is based on the concrete reaching a specified strength, the concrete shall be presumed to have reached this strength when either of the following conditions has been met.
 - a. When test cylinders, field cured along with the concrete they represent, have reached the strength specified for removal of formwork. Except for the field curing and age at test, the cylinders shall be molded and tested as specified in ASTM C31.
 - b. When the concrete has been cured for the same length of time as the age at test of laboratory-cured cylinders which reached the specified strength. The length of time the concrete has been cured in the structure shall be determined by a cumulative number of days or fractions thereof, not necessarily consecutive, during which the temperature of the air in contact with the concrete is above 50 °F and the concrete has been damp or thoroughly sealed from evaporation and loss of moisture.

C. Removal:

1. In removing plywood forms, no metal pinch bars shall be used and special care shall be taken in stripping. Start at top edge or vertical corner where it is possible to insert wooden wedges. Wedges shall be done gradually and shall be accompanied by light tapping on the plywood panels to crack them loose. Do not remove forms with a single jerk after it has been started at one end.
2. Forms shall be left in place as long as possible to permit shrinkage away from concrete, and plywood forms shall be left in place until all other forms around are stripped and until there

is no danger of damaging the architectural concrete due to other work in the vicinity.

- D. Protection: After stripping, Contractor shall properly protect all concrete to be exposed in the finish work from damage, with boards and nonstaining building paper to prevent staining, spalled edges, chips, etc.

3-06 RE-USE OF FORMS:

- A. Clean and repair surfaces of forms to be re-used in the Work. Split, frayed, delaminated or otherwise damaged formfacing material will not be acceptable. Apply new form coating compound material to concrete surfaces as specified for new formwork. When forms are reused for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets.

3-07 FIELD QUALITY CONTROL:

- A. The Contractor shall notify the Architect 48 hours prior to placing of any concrete, and after placement of reinforcing steel in the forms.
- B. Rejection of Defective Work Due to Improper Forms: Any movement or bellying of forms during construction or variations in excess of the tolerances specified will be considered just cause for the removal of such forms and, in addition, the concrete work so affected. Reconstruction of forms and new concrete shall be furnished at no additional cost to the Owner.

END OF SECTION

SECTION 03200

STEEL REINFORCEMENT

PART 1: GENERAL

1-01 SUMMARY:

- A. Work Included: Provide complete, in place, all steel required for reinforcement of concrete and masonry as shown on the drawings.
- B. Related Sections:
 - 1. Section 02450 – Site Work Concrete
 - 2. Section 03100 - Concrete Formwork
 - 3. Section 03300 - Cast-in-Place Concrete
- C. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specifications sections, apply to this Section.

1-02 REFERENCES:

- A. Codes and Standards: Comply with the pertinent provisions of the following codes and standards (latest editions).
- B. American Society for Testing and Materials (ASTM):
 - A82 Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - A185 Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
 - A615 Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.
 - A675 Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties.
 - A706 Standard Specification for Low Alloy Steel Deformed & Plain Bars for Concrete Reinforcement.
- C. California Building Standards Commission (CBSC):
 - California Building Code, 2010 Edition (CBC)
- D. American Welding Society (AWS):
 - D1.4 Structural Welding Code - Reinforcing Steel

- E. American Concrete Institute (ACI):
 - 117 Standard Tolerances for Concrete Construction and Materials.
 - SP-66(04) Detailing Manual
 - 318 Building Code Requirements for Reinforced Concrete
- F. Concrete Reinforcing Steel Institute (CRSI):
 - Manual of Standard Practice
- G. Wire Reinforcing Institute (WRI)
 - Manual of Standard Practice
- H. Title 24, Part 2, California Code of Regulations.

1-03 SUBMITTALS:

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specifications.
- B. Shop Drawings: Submit complete Shop Drawings of all material proposed to be furnished and installed under this Section. Show:
 - 1. Bar schedules, stirrup spacing, diagrams of bent bars, and arrangement and assemblies.
 - 2. Make Shop Drawings in accordance with ACI SP-66 or CRSI Manual of Standard Practice.
- C. Mill Certificates: Accompanying the Shop Drawings, submit steel producer's certificates of mill analysis, tensile, and bend tests for reinforcing steel.
- D. Tests: Submit test reports for reinforcing steel.
- E. Welding Affidavit: The welding inspector shall furnish the Architect with an affidavit stating that all welding has been performed in compliance with the drawings and specifications and all work has been accomplished by certified welders.

1-04 PRODUCT HANDLING:

- A. Delivery: Deliver reinforcement to the job site bundled, tagged and marked. Use metal tags indicating bar size, lengths, and other information corresponding to marking shown on placement diagrams.
- B. Storage: Store reinforcement at the job site in a manner to prevent damage and accumulation of dirt and excessive rust. Maintain identification of steel after bundles are broken.
- C. Identification:
 - 1. Use waterproof tags and markings and do not remove until steel is in place.
 - 2. Bundles of reinforcing steel shall be tagged showing quantity, grade, size and suitable identification marks for checking, sorting and placing.

3. Bundles of flat sheets and rolls of welded wire fabric shall be tagged showing quantity, style designation, width and length.

PART 2: PRODUCTS

2-01 MATERIALS:

- A. Reinforcing Bars: Comply with ASTM A615, Grade 60 including supplementary requirement S1.
- B. Welded Bars: Reinforcement to be welded shall fulfill the requirements for weldability in conformity with AWS D1.1-1006, or shall conform to ASTM A706, Grade 60.
 1. The carbon equivalent (C.E.) of reinforcing bars or splice material shall be calculated from the chemical composition as shown in the mill report by the following formula:
$$\text{C.E.} = \%C + \%Mn/6 + \%Cu/40 + \%Ni/20 + \%Cr/10 - \%Mo/50 - \%V/10$$
 2. The carbon equivalent shall be limited to 0.45% for #7 bars and larger and 0.55% for #6 bars and smaller.
 3. If mill test reports are not available, chemical analysis shall be made of bars representative of the bars to be welded. Bars with a C.E. above 0.75 shall not be welded. Welding shall not be done on or within two bar diameters of any bent portion of a bar which has been bent cold. Low hydrogen welding rods shall be used on all reinforcing bars.
- C. Steel Wire: Comply with ASTM A82, except that F_y shall be the stress corresponding to a strain of 0.35 percent if the yield strength specified in the design exceeds 60,000 psi.
- D. Welded Wire Fabric: Comply with ASTM A185, except that welded intersections shall be spaced not farther apart than 12 inches in the direction of the principal reinforcement.
- E. Dowels: Dowels for all construction joints in slabs on grade shall comply with ASTM A675 Grade 80.
- F. Supports for Reinforcement in Place:
 1. For formed surfaces use wire bar type supports complying with CRSI Manual of Standard Practice, Class 1, unless otherwise indicated. Do not use wood, brick, and other similar materials.
 2. For exposed-to-view concrete surfaces, where legs of supports are within 1/2 inch of the concrete surface, provide supports with either plastic protected legs or stainless steel.
 3. For slabs on grade or foundations, use precast concrete blocks, plastic-coated steel with bearing plates or specifically designed wire-fabric supports fabricated of plastic. Precast blocks shall be not less than 4 inches square and shall have a compressive strength equal to or greater than the strength of the surrounding concrete.
- G. Spirals: Deformed bars conforming to ASTM A615 Grade 60 or cold-drawn wire conforming to ASTM A82.
- H. Tie Wire: 16 ½ gauge or heavier, black, annealed wire.

- I. Identification: Bundle and tag reinforcing steel with grades and suitable identification marks for checking, sorting and placing. Use waterproof tags and markings and do not remove until steel is in place.

2-02 FABRICATION:

- A. General: Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI Manual of Standard Practice or ACI SP-66 and the details shown on the plans. In case of fabricating errors, do not rebend or straighten reinforcement in a manner that will injure or weaken the material.
- B. Unacceptable Materials: Reinforcement with any of the following defects will not be permitted in the work.
 1. Bar lengths, depths, and bends exceeding specified fabrication tolerance.
 2. Bend or kinks not indicated on the project drawings or the final Shop Drawings.
 3. Bars with reduced cross-section due to excessive rusting or other cause.
- C. Bends shall be made cold using pin sizes as recommended ACI 318 as modified by T24, CBC, Part 2.
- D. Spirals:
 1. Provide one and one-half finishing turns top and bottom of spirals, minimum.
 2. Provide spacers per Chapter 5, Section 9 of the CRSI Manual of Standard Practice.

PART 3: EXECUTION

3-01 INSTALLATION:

- A. General:
 1. Comply with the specified standards for details and methods of reinforcement placement and supports, and as herein specified.
 2. Clean reinforcement to remove loose rust and mill scale, earth, oil and other materials which reduce or destroy bond with concrete.
 3. Position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.
 4. Place reinforcement to obtain the minimum coverages for concrete protection as required by ACI 318. Arrange, space, and securely tie bars and bar supports together with 16 gage wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that twisted ends are directed away from exposed concrete surface.
 5. Install welded wire fabric in as long as lengths as practicable. Lap adjoining pieces not less than the spacing of the cross wires plus two inches or 6" whichever is greater. Offset end laps in adjacent widths. Fabric shall be wired or clipped together at laps at intervals not to

exceed 4 feet. Fabric shall be positioned by the use of supports.

6. Provide sufficient numbers of supports and of strength to carry reinforcement. Do not place reinforcing bars more than 2" beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
7. Place bars so as to comply with the locations shown in the drawings within the tolerances permitted by ACI 117.
8. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed the above tolerances, the resulting arrangement of bars shall be subject to the review of the Architect.
9. Dowels at slab on grade construction joints shall be installed normal to the joint and parallel to the finished concrete surface, and rigidly supported during concrete placement. One end of dowels shall be coated with a bond breaker.
10. Secure footing dowels in place before concrete is deposited. If there are no bars in position to which dowels may be tied, add No. 3 minimum to provide proper support and anchorage.
11. Templates shall be furnished for placement of all column dowels.
12. Fully encased structural steel members shall be wrapped with 4x4 inch mesh of W2.9 wire applied around the steel over spacers providing 3/4 inch clearance from the member. Lap ends 8 inches and tie.
13. Reinforcing steel shall not be flame cut.

B. Splices:

1. Provide reinforcement splices by lapping ends the amount shown on the drawings by placing bars in contact, and tightly wire tying. Lapped splices shall not be used for bars larger than No. 11.
2. Where splices in addition to those indicated on the drawings are necessary, they shall be reviewed by the Structural Engineer prior to their use. Splices shall not be made in beams, girders and slabs at points of maximum stress.
3. Welded splices and mechanical connections:
 - a. Welded splices and other mechanical connections may be used when reviewed by the Structural Engineer.
 - b. Welding shall conform to AWS D1.4.
 - c. Welded splices shall have bars butted and welded to develop in tension at least 125 percent of the specified yield strength of the bar.
 - d. Mechanical connections shall develop in tension or compression, as required, at least 125 percent of the specified yield strength of the bar. Install in accordance with manufacturer's recommendations.

4. Vertical bars in columns shall be offset at least one bar diameter at lapped splices.
 5. All splices not shown in the contract documents shall be subject to review.
 6. Unless permitted by the Structural Engineer, reinforcement shall not be bent after being embedded in hardened concrete.
 7. Splices for spirals shall be a tension lap splice of 48 bar diameters minimum, but not less than 12 inches or by welding.
- C. Welding: Welds shall be made only by operators who have been previously qualified by tests, as prescribed in the "Qualification Procedure" of the American Welding Society, to perform the type of work required, except that this provision need not apply to tack welds not later incorporated into finished welds carrying calculated stress.

3-02 QUALITY CONTROL:

- A. Examine the substrate, formwork, and the conditions under which concrete reinforcement is to be placed, and correct conditions which would prevent proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. The placement of all reinforcement shall be continuously inspected by an independent inspection agency designated by the Owner, or by the project inspector.
- C. Testing:
 1. Samples of reinforcing steel shall be taken by a designated approved testing agency at place of distribution, prior to shipment, or at site.
 2. Where samples are taken from bundles from the mill, with the bundles identified as to heat number, then one tensile test and one bending test shall be made from specimens from each ten tons or fraction thereof of each size or grade of reinforcing steel from bundles as delivered from mill, and properly identified as to heat number. Furnish certified mill test reports identifying material as to heat number, including chemical and physical properties.
 3. Where positive identification of the heat numbers cannot be ascertained or where random samples are taken, then one series of tests shall be made from each two and one-half (2-1/2) tons or fraction thereof, of each size or grade of reinforcing steel.
 4. Samples shall consist of not fewer than two pieces, each eighteen (18") inches long, of each size and grade of reinforcing steel.
 5. The approved testing agency shall identify acceptable units of reinforcing with tags.
- D. Inspection of Welded Reinforcing Bars: Inspection of all shop and field structural welding operations shall be made by a qualified welding inspector, designated by the Owner and approved by the Division of the State Architect. Such inspector shall be trained and thoroughly experienced in inspecting reinforcing bar welding operations. The inspector's ability to distinguish between sound and unsound welding shall be reliably established.

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.

The welding inspector shall check the material, equipment, details of construction, and procedure as well as the welds. He shall also check the ability of the welder. He shall furnish the Architect and the Division of the State Architect with a verified report that the welding which is required to be inspected is proper and has been done in conformity with the plans and specifications. He shall use all means necessary to determine the quality of the weld. He may use gamma ray, magnaflux, trepanning, sonics or any other aid to visual inspection which he may deem necessary to assure himself of the adequacy of the welding.

3-03 RECORD DRAWINGS:

- A. Shop drawings shall be corrected to reflect actual field changes and shall be submitted to the Architect.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1: GENERAL

1-01 DESCRIPTION:

- A. Work Included: Provide all cast-in-place concrete for buildings and structures, complete, in place, as indicated on the Drawings, specified herein, and as required for a complete and proper installation.
- B. Related Work Described Elsewhere:
 - 1. Section 02450 – Sitework Concrete
 - 2. Section 03100 – Concrete Formwork
 - 3. Section 03200 – Steel Reinforcing
 - 4. Anchors and miscellaneous metal items to be embedded in concrete
 - 5. Sleeves for mechanical and electrical items

1-02 QUALITY ASSURANCE:

- A. Codes and Standards:
 - 1. Comply with applicable provisions of the following codes and standards (latest editions):
 - a. California Building Standards Commission (CBSC):
California Building Code, (CBC), 2010 Edition.
 - b. American Concrete Institute (ACI):

ACI 211.1	Standard Practice for Selecting Proportions for Normal and Heavyweight Concrete.
ACI 214	Recommended Practice for Evaluation of Strength Test Results of Concrete
ACI 304R	Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 305R	Hot Weather Concreting
ACI 306.1	Standard Specification for Cold Weather Concreting
ACI 308	Guide to Curing Concrete

ACI 309	Guide for Consolidation of Concrete
ACI 318	Building Code Requirements for Reinforced Concrete
SP-2 99	Manual of Concrete Inspection

c. American Society for Testing and Materials (ASTM): The specifications and standards hereinafter referred to, are the latest editions, except when year is specified.

C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field.
C33	Standard Specification for Concrete Aggregates.
C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
C40	Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
C42	Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
C94	Standard Specification for Ready-Mixed Concrete
C114	Methods of Chemical Analysis of Hydraulic Cement
C127	Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
C128	Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
C131	Standard Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
C138	Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
C142	Standard Test Method for Clay Lumps and Friable Products in Aggregates

C143	Standard Test Method for Slump of Hydraulic Cement Concrete
C144	Standard Specification for Aggregates for Masonry Mortars
C150	Standard Specification for Portland Cement
C156	Standard Test Method for Water Retention by Concrete Curing Materials
C157	Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete
C167	Standard Test Methods for Thickness and Density of Blanket or Batt Thermal Insulation
C171	Standard Specification for Sheet Materials for Curing Concrete
C172	Standard Practice for Sampling Freshly Mixed Concrete
C173	Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
C192	Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
C227	Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method)
C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
C233	Standard Testing Method for Air-Entraining Admixtures for Concrete
C260	Standard Specifications for Air-Entraining Admixtures for Concrete
C289	Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)
C309	Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete
C387	Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete
C494	Standard Specification for Chemical Admixtures for Concrete

C535	Test Method for Resistance to Degradation of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
C595	Standard Specification for Blended Hydraulic Cements
C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolans for Use in Concrete
C666	Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
D75	Standard Practice for Sampling Aggregates
D1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural construction (Nonextruding and Resilient Bituminous Types)
D1752	Standard Specification for Preformed Sponge Rubber Cork and PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
D2103-86	Standard Specification for Polyethylene Film and Sheeting
E329	Standard Specification for Agencies engaged in Construction Inspection and/or Testing
E1155	Standard Test Method for Determining Floor Flatness and Floor Levelness Using the F-Number System
d.	Federal Specifications (Fed. Spec.)
UU-B-790A	Building Paper, Vegetable Fiber; (Kraft, Waterproofed, Water Repellent and Fire Resistant)
CCC-C-467C	Cloth, Burlap, Jute (or Kenaf)
DDD-M-148	Mats; Cotton (for Concrete Curing)
e.	Provisions of California Building Code, Title 24, Part 2 are applicable to the work. When requirements of such codes are at variance with requirements specified in foregoing paragraph, the provisions of California Building Code shall take precedence.
f.	U.S. Army Corps of Engineers Handbook for Concrete and Cement.
CRD-C572-74	Polyvinyl Chloride Waterstop
CRD-C621-93	Non-Shrink Grout

B. Qualifications of Installer:

1. Throughout the progress of installation of the work of this Section, provide at least one person who shall be thoroughly familiar with the specified requirements, completely trained and experienced in the necessary skills, and who shall be present at the site and shall direct all work performed under this Section.
2. In actual installation of the work of this Section, use adequate numbers of skilled workmen to insure installation in strict accordance with the contract documents design.
3. In acceptance or rejection of work performed under this Section, the Architect will make no allowance for lack of skill on the part of the workmen.

1-03 SUBMITTALS:

- A. General: Comply with the provisions of Section 01300.
- B. Shop Drawings: Submit shop drawings showing location of construction and control joints other than as indicated on the drawings.
- C. Delivery Tags: Submit copies of delivery tags for all concrete.
- D. Test Reports: Submit reports of tests hereinafter required to Architect.
- E. Sample: Submit two quart sample of aggregate to be used for seeding in exposed aggregate finish.
- F. Concrete Mix Designs: Submit proposed concrete mix designs for all types and uses of concrete.
- G. Cement: Submit manufacturer's certificate of conformance and affidavit for cement.

PART 2: PRODUCTS

2-01 MATERIALS:

- A. Cement:
 1. Cement shall conform to ASTM C150, Type I or Type II. The cement used in the work shall correspond to that on which the selection of concrete proportions is based.
 2. Where aggregates contain reactive substances low alkali cement shall be used in all structural concrete. Low alkali cement shall not contain more than 0.6 percent total alkali when calculated as sodium oxide as determined by the method given in ASTM C114.
 3. All cement used in the manufacture of concrete for exposed surfaces shall be of the same brand and type, except as otherwise specifically permitted in writing by the Architect.
 4. The contractor shall furnish to the Architect and the Division of the State Architect a certification from the cement manufacturer that the cement proposed for use in the project has been manufactured and tested in compliance with ASTM C150. An affidavit shall be provided by the contractor which identifies the cementitious material used for the project by the manufacturer's lot number, date of shipment from the manufacturer, date of receipt of cementitious material by the contractor, place of storage and date of use.

B. Concrete Aggregates:

1. Hardrock Aggregate:

- a. Concrete aggregate shall conform to ASTM C33, except as modified herein. The sieves used in the sieve analysis shall be of square mesh wire cloth.
- b. Fine and coarse aggregates shall be regarded as separate ingredients. Each size of coarse aggregate, as well as the combination of sizes when two or more are used, shall conform to the grading requirements of ASTM C33.
- c. Coarse aggregate: Coarse aggregate shall consist of a clean, hard, fine grained, sound crushed rock, or washed gravel or a combination of both. It shall be free from oil, organic matter, or other deleterious substances. Aggregate shall be uniformly graded from one-quarter inch size to maximum size.
- d. The maximum size of aggregates used in the project shall be consistent with the dimensions and form of the section being placed, the location and spacing of the reinforcing bars, and with the method of compaction, and shall be such as will produce dense and uniform concrete free from rock pockets, honey-comb and other irregularities. The nominal maximum size of the aggregate shall not be more than one-fifth the narrowest dimension between forms, one-third the depth of slabs nor three-fourths the minimum clear spacing between reinforcing bars.
- e. Combined Grading: The combined grading shall be such that the percentage by weight of the combined aggregates shall fall within the limits established as follows:

Percentage by Weight

Sieve number or size in inches	1-1/2" maximum	1"	3/4"
Passing a 2-inch	----	----	----
Passing a 1-1/2 inch	95-100	----	----
Passing a 1-inch	70-90	90-100	----
Passing a 3/4-inch	50-80	70-95	90-100
Passing a 3/8-inch	40-60	45-70	55-75
Passing a No. 4	35-55	35-55	40-60
Passing a No. 8	25-40	27-45	30-46
Passing a No. 16	16-34	20-38	23-40
Passing a No. 30	12-25	12-27	13-28
Passing a No. 50	2-12	5-15	5-15
Passing a No. 100	0-3	0-5	0-5

- f. Special grading or size limitations: When reviewed by the Architect and approved by the Division of the State Architect other gradings or maximum size limitations may be used if mixes are designed and tested in accordance with Method 1 specified in Para 2-02B.
- g. Soundness of Aggregates: Both the coarse and fine aggregate shall be tested by the

use of a solution of sodium or magnesium sulfate, or both, whenever in the judgment of the Architect, or the Division of the State Architect such tests are necessary to determine the quality of the material. Such tests shall be performed in accordance with ASTM C88 and the results shall show compliance with the limits set forth in ASTM C33.

- h. Reactivity: Aggregates shall be free from any substance which may be deleteriously reactive with the alkalis in the cement in an amount sufficient to cause excessive expansion of the concrete or which will interfere with normal hydration of the cement. Acceptability of the aggregate shall be based upon satisfactory evidence that the aggregate is free from such materials.
- i. Aggregates shall be tested, when required by the Architect prior to the concrete mix being established, in accordance with the following specifications:

Test	Specification
Abrasion	ASTM C131 and C535
Gradation	ASTM C136
Alkali Reactivity	ASTM C289
Organic Impurities	ASTM C40
Clay Lumps	ASTM C142
Alkali Reactivity	ASTM C227

C. Water:

- 1. Water used in mixing concrete shall be clean, potable, and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to concrete or reinforcement.
- 2. Conform to the requirements of ASTM C94.

D. Admixtures:

- 1. Admixtures shall be reviewed by the Architect and approved by the Division of the State Architect.
- 2. An admixture shall be shown capable of maintaining essentially the same composition and performance throughout the work as the product used in establishing concrete proportions.
- 3. Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions are not permitted.
- 4. Admixtures to be used in concrete shall conform to the specifications listed below:
 - a. Air-entraining admixtures: Conform to ASTM C260. Use Air Mix by the Euclid Chemical Company, Micro-Air by Master Builders, Sika AER by Sika Corporation or equivalent.
 - b. Water-reducing admixtures: Conform to ASTM C494 Type A. Use Eucon WR-75 by the Euclid Chemical Company, Pozzolith 200N by Master Builders, Plastocrete 161 by Sika Corporation or equivalent.

- c. Water-reducing, retarding admixtures: Conform to ASTM C494 Type D. Use Eucon Retarder-75 by the Euclid Chemical Company, Pozzolith 300-R by Master Builders, Plastiment by Sika Corporation or equivalent
 - d. High Range Water-Reducing Admixture (HRWR): Conform to ASTM C494 type F or G. Use Eucon 37 by the Euclid Chemical Company, Pozzolith Rheobuild 100 or 716 by Master Builders, Sikament 300 or 320 by Sika Corporation or equivalent. Where more than 30 minutes is required between the addition of admixtures to final placement of the concrete, a combination of water-reducing, set controlling admixtures (ASTM C494, Types A, D and E) may be used.
 - e. Non-Corrosive, Non-Chloride Accelerator: Conform to ASTM C494 Type C or E. Use Accelguard 80 by the Euclid Chemical Company, Pozzutec 20 by Master Builders, Plastocrete 161FL by Sika Corporation or equivalent. The admixture manufacturer shall have long-term (more than one year duration) non-corrosive test data on metal deck and reinforcing steel from an independent testing laboratory using an acceptable accelerated corrosion test method such as using electrical potential measures.
 - f. Fly Ash: Conform to ASTM C618 Class C or F. The use of a quality fly ash will be permitted as a cement-reducing admixture up to a maximum of 15% of the weight of portland-cement. The loss on ignition in Table 1 or C618 shall not exceed 3%. Quality assurance testing and reports for a minimum of six months shall be submitted by the fly ash supplier. The amount retained on the 325 sieve in Table 2 shall not exceed 20%
5. Certification: Certification of the above requirements and chloride ion content is required from the admixture manufacturer prior to mix design review.
- E. Preformed Expansion Joint Filler:
- 1. Premolded expansion joint filler shall be of the type required by the contract documents and shall conform to one of the following.
 - a. General Use: ASTM D1751
 - b. Sealant Topped: ASTM D1752, Type I or II.
- F. Curing Materials:
- 1. Liquid membrane-forming compound shall conform to ASTM C309, Type 1, Class B and shall conform to the California Air Resources Board requirements. Use Kurez VOX by the Euclid Chemical Company, Masterkure or Masterkure W by Master Builders, Aqua Resin Cure by Burke or equivalent.
 - 2. Impervious Membrane conforming to ASTM C171:
 - a. Clear or white polyethylene sheeting, 6 mil minimum thickness.
 - b. Waterproof kraft paper conforming to Fed. Spec. UU-B-790A.

- c. Polyethylene coated burlap. 6 mil white opaque polyethylene film impregnated or extruded on one side of burlap. Burlap shall weigh not less than 9 ounces per square yard and shall conform to Fed. Spec. CCC-C-467C.
 - 3. Absorptive Mats:
 - a. Burlap conforming to Fed. Spec. CCC-C-467C weighing not less than 9 ounces per square yard.
- G. Curing and Sealing Compounds: The compound shall conform to ASTM C309 Type 1, Class B and the California Air Resources Board with 30% solids content minimum and having moisture retention tests per ASTM C156 by an independent testing laboratory showing a maximum moisture loss of 0.03 gm/cm² at a coverage of 300 square feet per gallon. Use Super Aqua Cure VOX by the Euclid Chemical Company, Kure-N-Seal WB by Sonneborn, Spartan-cote WB by Burke, or equivalent.
- H. Abrasive Aggregate: Aluminum oxide grits or crushed emery. Use material that is factory-graded, packaged, rust-proof, non-glazing, and unaffected by freezing, moisture and cleaning materials. Use Non-Slip by Euclid Chemical Company, Frictex H or NS by Sonneborn or equivalent.
- I. Dry Shake Hardeners:
 - 1. Mineral Aggregate Hardener: Mastercron by Master Builders or Surfex by the Euclid Chemical Company or equivalent.
 - 2. Metallic Aggregate Hardener: Masterplate 200 by Master Builders or Euco-Plate the Euclid Chemical Company or equivalent.
 - 3. Heavy Duty Metallic Aggregate Topping: Anvil-Top 200-I by Master Builders or Euco Top by the Euclid Chemical Company or equivalent.
- J. Concrete Sealer: The compound shall be a water based acrylic sealer and shall meet the California Air Regulation Board requirements. Use Floor Seal VOX at interior locations and Diamond Seal VOX at exterior slabs by the Euclid Chemical Company or equivalent.
- K. Plastic Strip Control Joint Filler: Plastic control joint material shall be at least one inch deep, T-shaped 1/16" thick plastic strip, with a minimum 3/4" wide Pull-Top stiffener. This plastic strip shall have suitable anchor to prevent vertical movement.
- L. Bonding Agent (non-structural): The compound shall be a polyvinyl acetate, re-wettable type, with a visible tinted pigment to indicate coverage. Use Eucoweld by the Euclid Chemical Company or Weld-Crete by the Larsen Company. Use only in areas not subject to constant moisture.
- M. Patching Mortar: The compound shall be an epoxy type, three component, 100% solids, pre-packaged and ready to use. Use Euco 456 Mortar by the Euclid Chemical Company, Sidatur 43 Patch-Pak by Sika Corporation or equivalent.
- N. Epoxy Adhesive: Two part component, 100% solids, 100% reactive compound suitable for use on dry or damp surfaces. Use Euco Epoxy #452 or Eucopoly LPL by the Euclid Chemical Company, Concsive 1001 or Brutem AB by Master Builders, or Sikadur Hi-Mod by the Sika Corporation.
- O. Epoxy Joint Filler: For use in all control and construction joints in exposed concrete floors subject to wheeled traffic use a two component, 100% solids compound with a minimum Shore "D" hardness of

50. Use Euco 700 or Euco Soff-Cut by Euclid Chemical Company, Masterfill CJ by Master Builders, Epolith P by Sonneborn or equivalent.

- P. Slab Joint Sealant: The sealant shall be a two component polyurethane joint sealant conforming to ASTM C920, Type M, Class 25. Use Eucolastic II by Euclid Chemical Company, Sikaflex-2c NS/SL by the Sika Corporation or Sonolastic SL2 by Sonneborn or equivalent.
- Q. Slab Joint Sealant (Jet Fuel Resistant): The sealant shall be a two component polyurethane joint sealant conforming ASTM C920, Type M, Class 25 and shall be jet fuel resistant. Use Euco Neo-Seal by Euclid Chemical Company or equivalent.
- R. Surface Evaporation Retardant: For use on hot and/or windy days to prevent rapid moisture loss and subsequent plastic shrinkage cracks in concrete slabs: Use Eucobar by the Euclid Chemical Company or Confilm by Master Builders or equivalent.

2-02 CONCRETE MIXES:

A. General:

- 1. The proportions of ingredients shall be such as to produce a mixture which will work readily into the corners and angles of the forms and around reinforcement by the methods of placing and consolidation employed on the work, but without permitting the materials to segregate or excessive free water to collect on the surface and to provide resistance to special exposures as given in ACI 318, Chapter 4.
- 2. Proportion and design structural concrete to develop the stipulated minimum ultimate compressive strength at 28 days by limiting the maximum proportions of the aggregates and water to the total volume of cement incorporated therein.
- 3. Aggregate shall be uniformly graded of the maximum size required in the structural notes included on the Drawings, shall produce concrete developing strength not less than that required in such notes.
- 4. Where different materials are to be used for different portions of the work, each combination shall be evaluated separately.
- 5. The Contractor shall submit the concrete mix designs to the Architect for review prior to placing any concrete.
- 6. The concrete mix design shall be prepared and signed by a civil engineer registered in California, when method 2 or 3 is used.
- 7. The mix-design shall be based on recent materials data, tested by an approved testing laboratory within the past six months.
- 8. If the source or character of the aggregate or cement changes during the course of the work, the Contractor shall resubmit a new mix design for review.
- 9. The concrete mix design submitted to the Architect shall include, but not necessarily be limited to the following:
 - a. Aggregate source and type

- b. Aggregate sieve analysis
 - c. Aggregate combined grading
 - d. Moisture content of fine aggregate
 - e. Aggregate specific gravity and unit weight
 - f. Weights of aggregate (saturated surface dry condition and stockpiled condition) weight of cement, and volume (or weight) of water
 - g. Type and source of cement
 - h. Proposed use of each mix design
 - i. Certification of the chloride content of individual admixtures and of the mixes proposed.
 - j. Admixture type and proportions
 - k. Amount of air entrainment
 - l. Maximum permissible slump
 - m. Design compressive strength at 28 days
 - n. Maximum aggregate size
 - o. Test reports of trial batches or previous batch tests used as the basis of the mix design
- B. Design Methods: Mixture proportions to provide the desired characteristics shall be developed using one of the methods described below.
- 1. Method 1:
 - a. Method 1 shall be used when the combination of materials is to be evaluated and the proportions selected on the basis of trial mixes.
 - b. Trial mixtures having proportions and consistencies suitable for the work shall be made based on ACI 211.1 using at least three different water-cement ratios or cement contents which will produce a range of strengths encompassing those required for the work. Trial mixes shall be designed to produce a slump within .75 in. of the maximum permitted, and for air-entrained concrete, within plus or minus .5 percent of the maximum allowable air content. The temperature of concrete used in trial batches shall be reported.
 - c. For each water-cement ratio or cement content, at least three compression test cylinders for each test age shall be made and cured in accordance with ASTM C192. They shall be tested for strength at 28 days or at the earlier or later age specified in accordance with ASTM C39. From the results of these tests a curve

shall be plotted showing the relationship between the water-cement ratio or cement content and the compressive strength. From this curve, the water-cement ratio or cement content to be used in the concrete shall be selected to produce the required average strength. The cement content and mixture proportions to be used shall be such that this water-cement ratio is not exceeded when slump is the maximum permitted. Control in the field shall be based upon maintenance of proper cement content, slump, and air content.

- d. The required average strength of the concrete mixes as tested in the laboratory shall be as follows unless a lower water-cement ratio or higher strength is required by special exposure requirements.

Specified Strength, f_c , psi	Required average Strength, psi
less than 3000	$f_c + 1000$
3000 to 5000	$f_c + 1200$
over 5000	$f_c + 1400$

- e. Tests shall be made by a testing laboratory approved by the Architect.

2. Method 2:

- a. In lieu of trial batches to establish required average strength level, appropriate field test data for concrete made with similar ingredients may be used as the basis of the mix design. The ability to produce the required average strength calculated in accordance with this method shall be determined on the basis of the strength test record of at least 15 tests made during the past year which will permit establishing, directly or by interpolation, the water-cement ratio corresponding to the required average strength.
- b. Where a concrete production facility has a record, based on at least 30 consecutive strength tests or two groups of tests totaling at least 30 within the past 12 months, the standard deviation shall be calculated. The record of tests from which the standard deviation is calculated shall:
 - (1) Represent similar materials, quality control procedures, and conditions to those expected. Changes in materials and proportions within the test record shall not have been more closely restricted than those for the proposed work.
 - (2) Represent concrete produced to meet a specified strength or a strength within 500 psi of that specified for the proposed work.
 - (3) Consist of at least 30 consecutive tests or two groups of tests totaling at least 30 tests.
- c. Where a concrete production facility does not have 30 test records, but there is a record of 15 to 29 consecutive tests, a standard deviation may be established as the product of the calculated standard deviation and the modification factor below. The compressive test records used for this calculation shall:

- (1) Represent similar materials, quality control procedures, and conditions to those expected. Changes in materials and proportions within the test record shall not have been more closely restricted than those for the proposed work.
- (2) Represent concrete produced to meet a specified strength or a strength within 500 psi of that specified for the proposed work.
- (3) Represent only a single record of consecutive tests that span a period of not less than 45 calendar days.

MODIFICATION FACTOR FOR STANDARD DEVIATION WHEN LESS THAN 30 TESTS ARE AVAILABLE:

NUMBER OF TESTS	MODIFICATION FACTOR FOR STANDARD DEVIATION
15	1.16
20	1.08
25	1.03
30 or more	1.00

- d. A strength test is the average of the strengths of two cylinders made from the same sample of concrete and tested at 28 days.
- e. The required average compressive strength f_{cr} used as the basis for selection of concrete proportions shall be the larger of the following formulas using a standard deviation as calculated above.

$$f_{cr} = f_c + 1.34s$$

$$f_{cr} = f_c + 2.33s - 500$$

where f_c = specified compressive strength of concrete (psi) and S = Standard Deviation.

3. Method 3:

- a. If suitable data from a record of at least 15 consecutive tests (Method 2) or from laboratory trial batches (Method 1) are not available, the concrete mix proportions shall be selected from the following table based on the required compressive strength and maximum permissible aggregate size:

Maximum Size Aggregate	Required Compressive Strength	Minimum Cement Content	Maximum Water-Cement Ratio
3/4 inch and 1 inch	2000 psi	5.7 sacks/cy	7.50 gal/sack
	2500 psi	6.5 sacks/cy	6.75 gal/sack
1-1/2 inch	3000 psi	7.1 sacks/cy	6.0 gal/sack
	2000 psi	5.3 sacks/cy	7.50 gal/sack
	2500 psi	5.8 sacks/cy	6.75 gal/sack
	3000 psi	6.6 sacks/cy	6.0 gal/sack

C. Limitations

1. Method 3 shall not be used for required concrete strengths exceeding 3000 psi.
2. Concrete mix designs for pumped concrete shall be based on Method 1 or 2.

D. Air Entrainment: Exterior concrete that, after curing, will be permanently exposed to freezing temperatures or de-icing chemicals shall contain entrained air within limits of the following table:

<u>Nominal Max. Size Aggregate</u>	<u>Total air content,</u> <u>percent by volume</u>	
	<u>Severe</u>	<u>Moderate</u>
3/8 inch	7.5	6
1/2 inch	7	5.5
3/4 inch	6	5
1 inch	6	4.5
1-1/2 inch	5.5	4.5
2 inch	5	4

The tolerance on air content as delivered shall be ± 1.5 percent.

E. Concrete for floors: The minimum cement content for floors shall be as follows regardless of the mix design method used:

<u>Maximum size</u> <u>of aggregate, in.</u>	<u>Cement, lb per</u> <u>cu yd</u>
1-1/2	470
1	520
3/4	540
1/2	590
3/8	610

F. Slump: The concrete mixes shall be proportioned for and placed the following slump. The maximum shall be allowed for one batch in any five consecutive batches tested. The slump shall be determined by ASTM C143:

1. 4 inch maximum for consolidation by vibration.
2. 5 inch maximum for consolidation by other methods.
3. 8 inch maximum for flowable concrete containing HRWR admixture (superplasticizer) with 3 inch maximum slump before addition of HRWR.

G. Admixtures: All concrete placed at ambient temperatures below 50°F shall contain the specified accelerator. All concrete placed at ambient temperatures above 80°F shall contain the specified retarder. All concrete required to be air-entrained shall contain the specified air-entraining admixture. When improved workability, pumpability, lower water-cement ratio, or high ultimate and/or early strength is required, the specified HRWR admixture may be used.

H. Special Exposure Requirements:

1. Concrete that will be subject to freezing and thawing in a moist condition shall have a maximum water cement ratio of 0.45 and shall have a minimum cement content of 6 sacks/cy.
 2. For concrete slabs on grade and other concrete that is intended to be water-tight shall have a maximum water cement ratio of 0.50.
 3. Concrete that will be exposed to deicing salts, brackish water, saltwater or spray from these sources shall have a maximum water cement ratio of 0.40 and shall have a minimum content of 6 sacks/cy.
- I. Chloride Ion Content: The maximum water-soluble chloride ion concentrations in hardened concrete at age 28 days, as a percentage by weight of cement, contributed from the ingredients including water, aggregates, cementitious materials and admixtures shall not exceed the following:
1. Prestressed Concrete: 0.06%
 2. Reinforced Concrete exposed to chloride in service: 0.15%
 3. Reinforced concrete that will be dry or protected from moisture in service: 1.00%
 4. Other Reinforced Concrete: 0.30%

2-03 GROUT MIXES:

- A. Dry Pack Grout: One part portland cement to 2 parts fine sand.
- B. Non-Shrink Grout:
1. Ready to use non-metallic aggregate product requiring only the addition of water at the job site. Product shall have the following characteristics:
 - a. Be capable of producing a mortar bed material having no drying shrinkage or settlement at any age.
 - b. Compressive strength of mortar (2" cubes) shall be not less than 5,000 psi at age seven days and 7,500 psi at age 28 days.
 2. Use Euco N-S Grout or Euco High Flow Grout by Euclid Chemical Company, Masterflow 928 or Masterflow 713 by Master Builders, or SonogROUT by Sonneborn or equivalent.

2-04 STORAGE OF MATERIALS:

- A. Cement shall be stored in weathertight buildings, bins, or silos which will exclude moisture and contaminants.
- B. Aggregate stockpiles shall be arranged and used in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of like aggregates. To insure that this condition is met, any test for determining conformance to requirements for cleanliness and grading shall be performed on samples secured from the aggregates at the point of batching. Frozen or

partially frozen aggregates shall not be used.

- C. Stockpiles of natural or manufactured sand shall be allowed to drain to insure a relatively uniform moisture content throughout the stockpile.
- D. Admixtures shall be stored in such a manner as to avoid contamination, evaporation, or damage. For those used in the form of suspensions or non-stable solutions, agitating equipment shall be provided to assure thorough distribution of the ingredients. Liquid admixtures shall be protected from freezing and from temperature changes which would adversely affect their characteristics.

PART 3: EXECUTION

3-01 PREPARATION BEFORE PLACING:

- A. Before concrete is placed, all equipment for mixing and transporting the concrete shall be clean, all debris and ice shall be removed from the spaces to be occupied by the concrete, forms shall be properly coated, and the reinforcing shall be thoroughly clean of ice or other deleterious coatings. Water shall be removed from the place of deposit before concrete is placed. All laitance and other unsound material shall be removed from hardened concrete before additional concrete is placed.
- B. Hardened concrete and foreign materials shall be removed from the inner surfaces of the conveying equipment.
- C. Formwork shall have been completed; reinforcement shall have been secured in place; expansion joint material, anchors, and other embedded items shall have been positioned; all preparations shall be reviewed by Architect and project inspector.
- D. Semiporous subgrades shall be sprinkled sufficiently to eliminate suction and porous subgrades shall be sealed.
- E. Concrete shall not be placed on frozen ground.

3-02 PRODUCTION OF CONCRETE:

- A. General: All concrete shall be mixed until there is a uniform distribution of materials and shall be discharged completely before mixer is recharged.
- B. Ready-Mixed Concrete: Ready-mixed concrete shall be batched, mixed, and transported in accordance with ASTM C94.
- C. Job-Mixing: Job mixing of structural concrete will not be permitted. Job mixing of concrete for other purposes will be permitted only when reviewed by the Architect. Job mixed concrete shall conform to ACI 318 Section 5.8.3. The capacity of the mixer shall be such that it will handle one or more full sack batches.
- D. Control of Admixtures:
 - 1. Admixtures shall be charged into the mixer as solutions and shall be measured by means of an approved mechanical dispensing device. The liquid shall be considered a part of the mixing water. Admixtures that cannot be added in solution may be weighed or may be measured by volume if so recommended by the manufacturer.

2. If two or more admixtures are used in the concrete, they shall be added separately to avoid possible interaction that might interfere with the efficiency of either admixture or adversely affect the concrete.
3. Addition of retarding admixtures shall be completed within 1 minute after addition of water to the cement has been completed, or prior to the beginning of the last three-quarters of the required mixing, whichever occurs first.
4. Admixtures shall be used in accordance with the manufacturer's instructions.

3-03 CONVEYING:

- A. Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients and in a manner which will assure that the required quality of the concrete is maintained.
- B. Conveying equipment shall be of a size and design such that detectable setting of concrete shall not occur before adjacent concrete is placed. Conveying equipment shall be cleaned at the end of each operation or work day. Conveying equipment and operations shall conform to the following additional requirements:
 1. Truck mixers, agitators and non-agitating units and their manner of operation shall conform to the applicable requirements of ASTM C94.
 2. Belt conveyors shall be horizontal or at a slope which will not cause excessive segregation or loss of ingredients. Concrete shall be protected against undue drying or rise in temperature. A suitable device shall be used at the discharge end to prevent apparent segregation. Mortar shall not be allowed to adhere to the return length of the belt. Long runs shall be discharged into a hopper or through a baffle.
- C. Chutes shall be metal or metal-lined and shall have a slope not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20 ft. long and chutes not meeting the slope requirements may be used provided they discharge into a hopper before distribution.
- D. Pumping or pneumatic conveying equipment shall be of suitable kind with adequate pumping capacity. Pneumatic placement shall be controlled so that segregation is not apparent in the discharged concrete. The loss of slump in pumping or pneumatic conveying equipment shall not exceed 2-in. Concrete shall not be conveyed through pipe made of aluminum or aluminum alloy. When the concrete is placed into final position by means of pumping, the pumping method for placing concrete shall be reviewed by the Architect and approved by the Division of the State Architect, at least one week prior to placing the concrete.

3-04 DEPOSITING:

- A. General: Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be located as shown in the contract documents or as approved. Placing shall be carried on at such a rate that the concrete which is being integrated with fresh concrete is still plastic. Concrete which has partially hardened or has been contaminated by foreign materials shall not be deposited. Temporary spreaders in forms shall be removed when the concrete placing has reached an elevation rendering their service unnecessary.

- B. Segregation: Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Concrete shall not be subjected to any procedure which will cause segregation.
- C. Consolidation: All concrete shall be consolidated by vibration so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting, or planes of weakness. Internal vibrators shall have a minimum frequency of 8,000 vibrations per min. and sufficient amplitude to consolidate the concrete effectively. They shall be operated by competent workmen. Use of vibrators to transport concrete within forms shall not be allowed. Vibrators shall be inserted and withdrawn at points approximately 18 in. apart. At each insertion, the duration shall be sufficient to consolidate the concrete, but not sufficient to cause segregation. A spare vibrator shall be kept on the job site during all concrete placing operations. Where the concrete is to have an as-cast finish, a full surface of mortar shall be brought against the form by the vibration process, supplemented if necessary by spading to work the coarse aggregate back from the formed surface.
- D. In depositing concrete in columns, walls or thin sections of considerable height, openings in forms, elephant trunks, tremies or other devices, shall be used that will permit the concrete to be placed in a manner that will prevent segregation and accumulations of hardened concrete on the forms or metal reinforcement above the level of the concrete. Concrete shall not be allowed to drop freely more than six feet. Such devices shall be so installed that concrete will be dropped vertically.
- E. After concreting is started, it shall be carried on as a continuous operation until placing of a panel or section, as defined by its boundaries or predetermined joints, is completed.
- F. Top surfaces of vertically formed lifts shall be poured generally level in layers not to exceed 18 inches.
- G. Where conditions made consolidation difficult, or where reinforcement is congested, batches of concrete adjusted to smaller size aggregates shall be used. The concrete batches shall be reviewed by the Architect.

3-05 TEMPERING AND CONTROL OF MIXING WATER:

- A. Concrete shall be mixed only in quantities for immediate use. Concrete which has set shall not be retempered, but shall be discarded.
- B. When concrete arrives at the project with slump below that suitable for placing, as indicated by the specifications, water may be added only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded. The water shall be incorporated by additional mixing equal to at least half of the total mixing required. An addition of water shall be accompanied by a quantity of cement sufficient to maintain the proper water-cement ratio. Such addition shall be reviewed by the Architect.

3-06 WEATHER CONDITIONS:

- A. Cold Weather Requirements:
 - 1. Comply with the applicable provisions of ACI 306.1, except as modified herein.
 - 2. Adequate equipment shall be provided for heating the concrete materials and protecting the

concrete during freezing or near freezing weather. All concrete materials and all reinforcement, forms, fillers, and ground with which the concrete is to come in contact shall be free from frost. No frozen materials or materials containing ice shall be used.

3. When mixing concrete during freezing or near freezing weather, or when the surrounding air is expected to be below 40° F. during placing or within 24 hr. thereafter, the mix shall have a temperature of at least 50° F., but not more than 90° F. The concrete shall be maintained at a temperature of at least 50° F. (55° F for sections less than 12 inches in any dimension) for not less than 72 hours after placing. When necessary, concrete materials shall be heated before mixing. Special precautions shall be taken for the protection of transit- mixed concrete.
4. If water or aggregate is heated above 100°F, the water shall be combined with the aggregate in the mixer before cement is added. Cement shall not be mixed with water or with mixtures of water and aggregate having a temperature greater than 100° F.
5. Do not place concrete during rain, sleet or snow.
6. All concrete placed at ambient temperatures below 50° F shall contain an accelerator admixture as specified herein.

B. Hot Weather Requirements:

1. Comply with the applicable provisions of ACI 305 except as modified herein.
2. When the ambient temperature exceeds 90° F, proper attention shall be given to ingredients, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures or water evaporation that may impair required strength or serviceability of the member or structure.
3. The ingredients shall be cooled before mixing, or flake ice or well-crushed ice of a size that will melt completely during mixing may be substituted for all or part of the mixing water if, due to high temperature, low slump, flash set or cold joints are encountered.
4. The placing temperature of the mix shall not exceed 90 ° F.
5. All concrete placed at ambient temperatures above 80°F shall contain a retarding admixture as specified herein.

3-07 EMBEDDED ITEMS AND CONSTRUCTION JOINTS:

A. Conduits and Pipes Embedded in Concrete:

1. Pipes, other than conduits for electrical circuits, shall not be embedded in structural concrete unless specifically reviewed by the Architect and approved by the Division of the State Architect. Any pipe or conduit may pass through any walls or floor slab by means of a sleeve so located that it does not impair the strength of the structure. Openings larger than 12 inches in any dimension shall be as detailed on the structural plans.
2. Unless otherwise approved, embedded pipes or conduits, other than those merely passing through, shall be not larger in outside dimension than one-third the thickness of the slab, wall, or beam in which they are embedded, nor shall they be spaced closer than three

diameters or widths on center and shall have at least 1.5 inch concrete cover.

3. Sleeves, pipes, or conduits of aluminum shall not be embedded in structural concrete unless effectively coated or covered to prevent aluminum-concrete reaction or electrolytic action between aluminum and steel.

B. Construction Joints:

1. Typical details and proposed locations of construction joints shall be as indicated on the Drawings. Joints shall be located as to least impair the strength of the structure as directed by the Architect and shall conform to the typical details.
2. Joints not indicated on the contract documents shall be located and constructed to minimize the impact on the strength of the structure. Joint types and location shall be acceptable to the Architect. In general, joints shall be located near the middle of the spans of slabs, beams, and girders unless a beam intersects a girder at this point, in which case the joint in the girder shall be offset a distance equal to twice the width of the beam. Joints in walls and columns shall be at the underside of floors, slabs, beams, or girders and at the tops of footings or floor slabs. Beams, girders, brackets, column capitals, haunches, and drop panels shall be placed at the same time as slabs. Joints shall be perpendicular to the main reinforcement.
3. All reinforcement shall be continued across joints. Longitudinal keys at least 1-1/2 in. deep shall be provided in all joints in walls and between walls and slabs or footings. Other keys and inclined dowels shall be acceptable to the Architect.
4. The surface of all horizontal construction joints shall be cleaned and roughened by removing the entire surface and exposing clean aggregate solidly embedded in mortar matrix. The contact surface must be thoroughly cleaned by chipping or sand blasting the entire surface not earlier than five days after initial pour or by an approved method that will assure equal bond such as a thorough hose washing of the surface not less than two or more than four hours after the concrete is placed (depending on setting time), all wash water and chalk-like material being entirely cleaned from the surface.
5. In the event that the contact surface becomes coated with earth, sawdust, etc., after being cleaned, the entire surface so coated shall be recleaned.
6. A mix containing the same proportion of sand and cement used in the concrete plus a maximum of 50 percent of the coarse aggregate shall be placed on horizontal joints before proceeding with the regular specified mix.
7. A delay at least until the concrete in columns and walls is no longer plastic must occur before casting or erecting beams, girders, or slabs supported thereon. Beams, girders, brackets, column capitals, and haunches shall be considered as part of the floor system and shall be placed monolithically therewith.
8. Bonding: When a bonded construction joint is required, bond shall be obtained by the use of a bonding compound for concrete as specified herein and shall conform to the manufacturer's instructions.

C. Waterstops:

1. The material, design, and location of waterstops in joints shall be as indicated in the contract documents.
2. Each piece of premolded waterstop shall be of maximum practicable length in order that the number of end joints will be held to a minimum.
3. Joints at intersections and at ends of pieces shall be made in the manner most appropriate to the material being used. Joints shall develop effective watertightness fully equal to that of the continuous waterstop material, shall permanently develop not less than 50 percent of the mechanical strength of the parent section, and shall permanently retain their flexibility.
4. The waterstop shall be securely held in place prior to pouring concrete.
5. The concrete shall be well vibrated adjacent to the waterstops to insure consolidated concrete without voids.

D. Control Joints:

1. Joints in slabs on grade shall be located and detailed as indicated in the contract documents.
2. If saw-cut joints are required or permitted, cutting shall be timed properly with the set of concrete. Cutting shall be started as soon as the concrete has hardened sufficiently to prevent aggregates being dislodged by the saw. Cutting shall be completed before shrinkage stresses become sufficient to produce cracking.
3. Plastic Strip Slab Control Joints: After preliminary troweling, the concrete shall be parted to a depth of approximately 2" with a joint thin metal straight edge. The plastic strip shall then be inserted in the impression so that the upper surface of the pull-top stiffener is flush with the concrete and pull-top stiffener is immediately peeled off. After the pull-top is removed the concrete shall be floated to fill all voids adjacent to the strip. During final troweling, the edges at plastic control joints shall be finished to a radius not to exceed 1/8" using a slit jointer tool. The finished joint opening shall not be wider than 1/8" exclusive of radii.
4. Sawcut joints in concrete may be used as an alternative to plastic strip control joints. At each control joint location saw cut concrete with Soff-Cut Model 566/656 Saw as manufactured by Soff-Cut International, Corona, CA. Sawings shall be completed no later than 2 hours after final finish, but sooner than 2 hours if the weight of the saw and operator can cut the concrete without disturbing the final finished product. The depth of cut shall be 3/4" to 1" and shall be 1/4" wide.

3-08 CURING AND PROTECTION:

A. General:

1. Comply with the applicable provisions of ACI 308 except as modified herein.
2. Beginning immediately after placement, concrete shall be protected from premature drying, excessively hot or cold temperatures, and mechanical injury, and shall be maintained with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing

shall be subject to approval.

B. Preservation of Moisture:

1. For concrete surfaces not in contact with forms, one of the following procedures shall be applied immediately after completion of placement and finishing:
 - a. Ponding or continuous sprinkling
 - b. Application of absorptive mats or fabric kept continuously wet
 - c. Application of sand kept continuously wet
 - d. Application of waterproof sheet materials, conforming to ASTM C171
 - e. Application of other moisture-retaining covering reviewed by Architect.
 - f. Application of a curing compound conforming to ASTM C309. The compound shall be applied in accordance with the recommendations of the manufacturer immediately after any water sheen which may develop after finishing has disappeared from the concrete surface. It shall not be used on any surface against which additional concrete or other material is to be bonded unless it is proven that the curing compound will not prevent bond, or unless positive measures are taken to remove it completely from areas to receive bonded applications. Exterior slabs, sidewalks, curbs, and architectural concrete shall be cured with the specified clear, non-yellowing curing compound.
2. When concrete slab placements are subject to high temperatures, wind and/or low humidity, the Architect may require the use of the specified surface evaporation retarder to minimize plastic cracking. The compound may be required to be applied one or more times during the finishing operation.
3. Moisture loss from surfaces placed against wooden forms or metal forms exposed to heating by the sun shall be minimized by keeping the forms wet until they can be safely removed. After form removal the concrete shall be cured until the end of the time prescribed.
4. Curing in accordance with Subparagraph 1 or 2 shall be continued for at least 7 days. Alternatively, if tests are made of cylinders kept adjacent to the structure and cured by the same methods, moisture retention measures may be terminated when the average compressive strength has reached 70 percent of the specified 28 day strength. If one of the curing procedures of Subparagraph 1(a) through 1(c) is used initially, it may be replaced by one of the other procedures of Subparagraph 1 any time after the concrete is 1 day old provided the concrete is not permitted to become surface dry during the transition.
5. Liquid membrane curing compounds shall not be used for curing slabs on grade when the ambient temperature exceeds 90° F or the wind velocity exceeds 10 mph.
6. Liquid membrane curing compounds shall not be used for curing when freezing weather is anticipated during the first few days of curing period.

C. Temperature, Wind and Humidity:

1. Cold weather: When the mean daily outdoor temperature is less than 40 degrees F, the temperature of the concrete shall be maintained between 50 and 70 degrees F for the required curing period. When necessary, arrangements for heating, covering, insulating, or housing the concrete work shall be made in advance of placement and shall be adequate to maintain the required temperature without injury due to concentration of heat. Combustion heaters shall not be used during the first 24 hr. unless precautions are taken to prevent exposure of the concrete to exhaust gases which contain carbon dioxide.
2. Hot weather: When necessary, provision for windbreaks, shading, fog spraying, sprinkling, ponding, or wet covering with a light colored material shall be made in advance of placement, and such protective measures shall be taken as quickly as concrete hardening and finishing operations will allow.
3. Rate of temperature change: Changes in temperature of the air immediately adjacent to the concrete during and immediately following the curing period shall be kept as uniform as possible and shall not exceed 5° F in any 1 hour or 50° F in any 24 hour period.

D. Protection from Mechanical Injury: During the curing period, the concrete shall be protected from damaging mechanical disturbances, such as load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage by construction equipment, materials, or methods, by application of curing procedures, and by rain or running water. Self-supporting structures shall not be loaded in such a way as to overstress the concrete. During the first 2 day period of curing, no traffic on or loading of the floors will be permitted.

3-09 FINISHING OF FORMED CONCRETE SURFACES:

A. General:

1. After removal of forms the surfaces of concrete shall be given one or more of the finishes specified below in locations designated by the contract documents or if the finish is not designated in the contract documents, the following as-cast finishes shall be used as applicable:
 - a. Rough form finish - For all concrete surfaces not exposed to public view.
 - b. Smooth form finish - For all concrete surfaces exposed to public view.
2. When finishing is required to match a small sample furnished to the contractor, the sample finish shall be reproduced on an area at least 100 sq. ft. in an inconspicuous location designated by the Architect before proceeding with the finish in the specified location.

B. As-cast finishes:

1. Rough form finish: No selected form facing materials shall be required for rough form finish surfaces. Tie holes and defects shall be patched. Fins exceeding 1/4 in. in height shall be chipped off or rubbed off. Otherwise, surfaces shall be left with the texture imparted by the forms.
2. Smooth form finish: The form facing material shall produce a smooth, hard, uniform texture on the concrete. It may be plywood, tempered concrete-form-grade hardboard, metal,

plastic, paper, or other acceptable material capable of producing the desired finish. The arrangement of the facing material shall be orderly and symmetrical, with the number of seams kept to the practical minimum. It shall be supported by studs or other backing capable of preventing excessive deflection. Material with raised grain, torn surfaces, worn edges, patches, dents, or other defects which will impair the texture of the concrete surface shall not be used. Tie holes and defects shall be patched. All fins shall be completely removed.

- C. Related unformed surfaces: Tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed and shall be floated to a texture reasonable consistent with that of the formed surfaces. Final treatment on formed surfaces shall continue uniformly across the unformed surfaces.

3-10 CONCRETE SLAB FINISHES:

- A. Integral monolithic finish shall be produced by striking surfaces of structural slabs at proper level. The concrete shall be rolled or tamped to force aggregate away from surfaces and surface shall then be screeded. After screeding and while the concrete is still plastic, the surface shall be floated with wood, cork, or metal floats or with a power finishing machine. During this operation, the surface shall be brought to a true grade by cutting or filing as may be appropriate. Care shall be exercised to avoid overworking the plastic concrete.
- B. Specified Finishes: Concrete finishes shall be as noted or scheduled on the Drawings to conform to the finish types listed below. When a specific type finish is not scheduled or otherwise noted, the finish shall be as follows:

<u>Floor Use</u>	<u>Finish Type</u>
Surfaces intended to receive bonded applied cementitious applications	Scratch finish
Surfaces intended to receive roofing, waterproofing membranes, or sand bed terrazzo	Floated Finish
Floors intended as walking surfaces; surfaces intended to receive floor coverings	Troweled Finish
Exterior Exposed Concrete	Broom or Belt Finish
Exterior Steps and Landings and for interior or exterior pedestrian ramps (with slopes exceeding 1 inch rise in 25 inch run)	Nonslip Finish
Vehicular Ramps	Cross-Scored Finish
Walks and Patios	Medium Broom Finish

C. Finish types:

1. Scratched Finish: After the concrete has been placed, consolidated, struck off, and leveled to a Class C tolerance, the surface shall be roughened with stiff brushes or rakes before the final set.
2. Floated Finish: After the concrete has been placed, consolidated, struck off, and leveled, the concrete shall not be worked further until ready for floating. Floating with a hand float or with a bladed power trowel equipped with float shoes, or with a powered disc float shall begin when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation. During or after the first floating, planeness of surface shall be checked with a 10-ft. straightedge applied at not less than two different angles. All high spots shall be cut down and all low spots filled during this procedure to produce a surface within Class B tolerance throughout. The slab shall then be refloated immediately to a uniform sandy texture.
3. Troweled Finish: The surface shall first be float-finished as specified above. It shall next be power troweled, and finally hand troweled. The first troweling after power floating shall produce a smooth surface which is relatively free of defects but which may still show some trowel marks. Additional trowelings shall be done by hand after the surface has hardened sufficiently. The final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The surface shall be thoroughly consolidated by the hand troweling operations. The finished surface shall be essentially free of trowel marks, uniform in texture and appearance and shall be plane to a Class A tolerance, except tolerance for concrete on metal deck shall be Class B. On surfaces intended to support floor coverings, any defects of sufficient magnitude to show through the floor covering shall be removed by grinding.
4. Broom or Belt Finish: Immediately after the concrete has received a float finish as specified above, it shall be given a coarse transverse scored texture by drawing a broom or burlap belt across the surface.
5. Nonslip Finish: Where the contract documents require a nonslip finish, the surface shall be given a "dry shake" application of abrasive aggregate. The rate of such material as recommended by the manufacturer shall be not less than 25 lb. per 100 sq. ft.
6. Cross Scored Finish: After placement, surface shall be rodded, floated and given a coarse broom finish. The surface shall then be scored at approximately 6" o.c. perpendicular to the line of traffic. Scoring shall be accomplished with a grooving tool which compresses the concrete rather than raking out. Scoring shall terminate approximately 5" from edges at which distance a tooled groove shall be provided running parallel with edges. Surface shall then be broomed again as required to remove any smooth surface developed with the grooving tool.
7. Public Works Dept. Standard Finish: Conform to requirements of the local department of public works.
8. Match Corresponding Existing Finish: Match finish on existing work which corresponds to similar work to be installed under this contract.

9. Cured and Sealed Finish: Apply liquid membrane curing and sealing compound specified herein to the troweled finish in accordance with the manufacturer's recommendations.
 10. Sealed Finish: Apply concrete sealer specified herein to a troweled finish in accordance with the manufacturer's recommendations.
- D. Finishing tolerances:
1. Finishes with Class A tolerances shall be true planes within 1/8 in. in 10 ft. as determined by a 10-ft straightedge placed anywhere on the slab in any direction.
 2. Finishes with Class B tolerances shall be true planes within 1/4 in. in 10 ft., as determined by a 10-ft straightedge placed anywhere on the slab in any direction.
 3. Finishes with Class C tolerances shall be true planes within 1/4 in. in 2 ft. as determined by a 2-ft straightedge placed anywhere on the slab in any direction.
- E. Subfloors:
1. Concrete floors scheduled to receive finish floor materials, e.g. resilient floor coverings, carpeting, ceramic tile, shall be prepared in accordance with requirements specified in the appropriate floor covering sections of these specifications. In the absence of specific requirements, the subfloor shall be prepared in accordance with recommendations of the finish floor material manufacturer.

3-11 FIELD QUALITY CONTROL:

- A. General:
1. Concrete materials and operations will be tested and inspected as the work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered nor shall it obligate the Architect for final acceptance.
 2. The Architect and the Division of the State Architect shall have the right to order the testing of any materials used in concrete construction to determine if they are of the quality specified.
- B. Testing and Inspection Agencies:
1. The required inspection services shall be performed by the inspection agency designated and/or the project inspector.
 2. The necessary testing services shall be performed by a testing agency acceptable to the Architect.
 3. All testing and inspection agencies shall meet the requirements of ASTM E 329.
- C. Testing and Inspection Services: The inspection shall conform to ACI SP-2. The following testing and inspection services shall be performed by the designated agency and the project inspector:
1. Preconstruction Testing: Sample and test aggregates for compliance.

2. Review and/or check-test the contractor's proposed materials for compliance with the drawings and specifications.
3. Keep records of all tests and inspections.
4. Observe forms and placement of placement of reinforcing steel, embedded items, and joints.
5. Batch Plant Inspection: The quality and quantity of materials used in transit mixed concrete and batched aggregates shall be continuously inspected at the location where materials are measured by a specially approved inspector.
6. Secure production samples of materials at plants, stock- piles, and at the point of placement during the course of the work and test for compliance with the specifications.
7. Conduct strength tests of the concrete during construction in accordance with the following procedures:
 - a. Secure composite samples in accordance with ASTM C172. Each sample shall be obtained from a different batch of concrete on a random basis, avoiding any selection of the test batch other than by a number selected at random before commencement of concrete placement.
 - b. Mold and cure three specimens from each sample in accordance with ASTM C31. Any deviations from the requirements of this Standard shall be recorded in the test report.
 - c. Test specimens in accordance with ASTM C39. Two specimens shall be tested at 28 days for acceptance and one shall be tested at 7 days for information. The acceptance test results shall be the average of the strengths of the two specimens tested at 28 days. If one specimen in a test manifests evidence of improper sampling, molding or testing, it shall be discarded and the strength of the remaining cylinder shall be considered the test result. Should both specimens in a test show any of the above defects, the entire test shall be discarded. When high early strength concrete is used, the specimens shall be tested at the ages indicated in the contract documents.
 - d. Make at least one strength test (a set of 3 cylinders) for each 50 cubic yards of structural concrete for each grade of concrete used and there shall be at least one test for each day's placement for each grade of concrete used. Provide at least one strength test for each 2000 square feet of surface area for slabs or walls.
 - e. On a given project, if the total volume of concrete is such that the frequency of testing above would provide less than five strength tests (a set of 3 cylinders) for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.
8. Determine slump of the concrete sample for each strength test and whenever consistency of concrete appears to vary, in accordance with ASTM C 143.
9. Determine air content of normal weight concrete sample for each strength test in accordance with either ASTM C231 or ASTM C 173.

10. Determine temperature of concrete sample for each strength test.
11. Determine air temperature at placement time. When the ambient temperature falls below 40°F or rises above 95°F, a complete record shall be kept of concrete temperatures and of protection given to concrete during placement and curing.
12. Inspect concrete batching, mixing and delivery operations.
13. Inspect the construction and removal of forms, falsework and shoring.
14. Inspect the conveying, placement, consolidation, finishing, curing, protection, repair, and patching of the concrete.
15. Review the contractor's plan for stripping and form removal.
16. Provide additional testing and inspection required because of changes in materials or proportions requested by the contractor.
17. Record any significant construction loads on completed floors, members, or walls.
18. Provide additional testing of materials or concrete occasioned by their failure by test or inspection to meet specification requirements.
19. Obtain the manufacturer's certificate of conformance and affidavit for cement. If not available, secure and test samples of cement. One sample of cement shall be taken for each 100 tons of cement, except that when used in bulk loading ready-mix plants where separate bins for pretested cement are not available, grab samples shall be taken for each shipment of cement placed in the bin, with not less than one sample being taken for each day's pour and such samples shall be subsequently tested.
20. A record shall be kept on the work of the time and date of placing concrete in each portion of the structure. Such record shall be kept until the completion of the structure and shall be open to the inspection of the Division of the State Architect.
21. Obtain licensed weighmaster's certificates for all concrete deliveries to verify quantities of materials.

D. Duties and Authorities of Designated Testing and Inspection Agency:

1. Representatives of the agency shall inspect, sample and test the materials and the production of concrete as required by the Architect. When it appears that any material furnished or work performed by the contractor fails to fulfill specification requirements, the testing agency shall report such deficiency to the Architect and the contractor.
2. The agency shall report all test and inspection results to the Architect and contractor immediately after they are performed. All test reports shall include the exact location in the work at which the batch represented by a test was deposited. Reports of strength tests shall include detailed information on storage and curing of specimens prior to testing.

E. Responsibilities and Duties of Contractor:

1. The contractor shall submit to the Architect the concrete materials and the concrete mix designs proposed for use.

3-12 CONTRACTOR'S RESPONSIBILITIES:

A. The contractor is solely responsible for the direction and supervision of the entire construction operation, the performance of materials and labor, safety of working conditions, and the ultimate quality of the structure.

2. The Contractor shall provide and maintain an adequate program of quality control for materials, production methods, and workmanship to assure conformance of all work to the project documents.

3. To facilitate testing and inspection, the contractor shall:

- a. Furnish any necessary labor to assist the designated testing agency in obtaining and handling samples at the project or other sources of materials.
- b. Advise the designated testing agency sufficiently in advance of operations to allow for completion of quality tests and for the assignment of personnel.
- c. Provide and maintain for the sole use of the testing agency adequate facilities for safe storage and proper curing of concrete test specimens on the project site for the first 24 hr. as required by ASTM C31.

B. Waivers of Tests and Inspections:

1. Batch Plant Inspection: Batch plant inspection will not be required under the following conditions:

- a. The concrete plant complies fully with the requirements of ASTM C94, and has been certified by an approved testing laboratory to comply with the requirements of the National Ready Mixed Concrete Association. The plant must be equipped with an automatic batcher in which the total batching cycle, except for the measuring and introduction of an admixture, is completed by activating a single starter device.
- b. The Testing Laboratory shall certify and submit evidence of compliance to the Division of the State Architect and obtain their approval prior for a waiver of batch plant inspection prior to mixing the concrete.
- c. Batch plant inspection is not required for foundation and slab on grade concrete.

2. If batch plant inspection is not provided the quantities of materials shall be certified by a licensed weighmaster.

3-12 EVALUATION AND ACCEPTANCE OF CONCRETE:

- A. Evaluation of test results:
1. Test results for standard molded and standard cured test cylinders shall be evaluated separately for each specified concrete mix design.
 2. For evaluation of potential strength and uniformity, each specified mix design shall be represented by at least five tests.
 3. Acceptance of Concrete: The strength level of the concrete will be considered satisfactory so long as the averages of all sets of three consecutive strength tests results equal or exceed the specified strength f'_c , and no individual strength test result falls below the specified strength f'_c .
- B. Investigation of Low-Strength Test Results:
1. If the strength of the molded test cylinders falls below the minimum ultimate compressive strength assumed in the design, the proportions of the concrete mix for the remaining portion of the structure shall be adjusted so as to give concrete of the assumed minimum strength. The doubtful concrete in place shall be tested by taking cores as outline below.
- C. Core Tests:
1. Cores shall be taken at representative places throughout the structure as designated by the Architect.
 2. Cores at least 4 in. in diameter shall be obtained and tested in accordance with ASTM C42. If the concrete in the structure will be dry under service conditions, the cores shall be air dried (temperature 60 to 80 F. relative humidity less than 60 percent), for 7 days before test and shall be tested dry. If the concrete in the structure will be more than superficially wet under service conditions, the cores shall be tested after moisture conditioning in accordance with ASTM C42.
 3. The cores shall be tested as required for cylinders.
 4. At least three representative cores shall be taken from each member or area of concrete in place that is considered potentially deficient. If, before testing, one or more of the core shows evidence of having been damaged subsequent to or during removal from the structure, it shall be replaced.
 5. Concrete in an area represented by core tests shall be considered adequate if the average of three cores is equal to at least 85 percent of the required compressive strength and no single core is less than 75 percent of the required compressive strength.
 6. Core holes shall be coated with an epoxy resin binder and packed with epoxy mortar as described in Paragraph 3-13.

3-13 REPAIR OF SURFACE DEFECTS:

A. General:

1. Surface defects, including tie holes, unless otherwise specified by the contract documents, shall be repaired immediately after form removal.

B. Repair of Defective Areas:

1. All honeycombed and other defective concrete shall be removed down to sound concrete. If chipping is necessary the edges shall be perpendicular to the surface or slightly undercut. No feathered edges will be permitted. The area to be patched and an area at least 6 in. wide surrounding it shall be dampened to prevent absorption of water from the patching mortar. The specified bonding agent shall be used for all patching and the specified epoxy adhesive/ and or epoxy mortar shall be used for all structural repairs. All patching and repairs shall have prior approval of the Architect as to method and procedure. Any concrete which has not been formed as shown on the contract drawings, is out of alignment or level or indicated a defective surface or unsoundness of any nature shall be removed and replaced to the limits required by the Architect unless the Architect grants permission to patch or otherwise correct the defective work. Permission to patch or attempt the correction shall not be construed to be a waiver of the Architect's right to require complete removal of the defective work.
2. The patching mixture shall be made of the same materials and of approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than 1 part cement to 2-1/2 parts sand by damp loose volume. White Portland cement shall be substituted for a part of the gray portland cement on exposed concrete in order to produce a color matching the color of the surrounding concrete, as determined by a trial patch. The quantity of mixing water shall be no more than necessary for handling and placing. The patching mortar shall be mixed in advance and allowed to stand with frequent manipulation with a trowel, without addition of water, until it has reached the stiffest consistency that will permit placing.
3. After surface water has evaporated from the area to be patched, the bond coat shall be well brushed into the surface. When the bond coat begins to lose the water sheen, the premixed patching mortar shall be applied. The mortar shall be thoroughly consolidated into place and struck off so as to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, it shall be left undisturbed for at least 1 hour before being finally finished. The patch area shall be kept damp for 7 days. Metal tools shall not be used in finishing a patch in a formed wall which will be exposed.
4. Repair materials and procedures, other than those specified may be used for repair when reviewed by the Architect. Materials include but are not limited to:
 - a. Shotcrete
 - b. Commercial patching products, including:
 - (1) Latex-modified Portland cement mortar.
 - (2) Latex bonding agents if not re-emulsifiable when subsequently exposed to moisture.

- (3) Epoxy mortars and compounds that are moisture insensitive with an epoxy binder that conforms to ASTM C 811, Type III.

Caution shall be exercised when using these materials with regard to possible color changes from weathering and delamination due to different coefficients of thermal expansion.

5. When required for exposed concrete that will be left unpainted, color tests shall be made with patching methods and materials to determine color compatibility.
- C. Tie Holes: After being cleaned and thoroughly dampened, the tie holes shall be filled solid with patching mortar.
- D. Foreign Materials: In the event efflorescence, stains, oil, grease, or any unsightly accumulation of foreign materials are visible on the exposed interior or exterior surfaces of finished concrete, the Architect may require remedial action to remove such blemishes.
1. Remove oil and grease with detergents and scrubbing and thoroughly wash with water. While the surface is wet, apply a grout coat of cement and fine sand mixed 1 to 1-1/2 with white cement added as directed to attain desired color. Immediately float surface with cork or other suitable floats to fill any holes. While the grout is plastic, finish with a sponge rubber float, removing excess grout. This shall be done when grout will not be pulled from holes. Allow surface to dry thoroughly, then rub with dry burlap to remove all dry loose grout. Complete all cleaning on any section in one day, leaving no loose grout on the surface after the termination of the regular work day.
 2. Spots or streaks remaining may be lightly dry honed in such manner that will not change the texture of the concrete.

3-14 CLEANING:

- A. All interior cement finishes shall be washed and mopped clean. Floors scheduled to receive floor coverings shall be left in proper condition to receive such covering. Integrally colored floors shall be waxed, except as may otherwise be required for a specified system. Exterior slab finishes shall be hosed clean, with all mortar or paint splotches, stains, or other defacements removed to the satisfaction of the Architect. Upon completion all equipment, forming materials and debris shall be removed from the site.

END OF SECTION

SECTION 04220

CONCRETE UNIT MASONRY

PART 1: GENERAL

1-01 DESCRIPTION:

- A. Work Included: Provide all concrete unit masonry, complete, in place, as indicated on the Drawings, specified herein, as required for a complete and proper installation.
- B. Work Described Elsewhere:
 - 1. Cast-in-Place Concrete
 - 2. Furnishing Steel Reinforcing and placement of dowels in the concrete
 - 3. Furnishing miscellaneous metal items embedded in the masonry.
 - 4. Caulking and Sealants
 - 5. Painting
 - 6. Waterproofing
- C. Definitions:
 - 1. Grout Lift: A lift is the layer of grout placed in a single continuous operation.
 - 2. Grout Pour: A pour is the entire height of grout fill placed in one day and is composed of a number of successively placed grout lifts.
 - 3. Concealed Masonry Surfaces: Concealed masonry surfaces are defined as follows:
 - a. Surfaces of foundation walls against which backfill is placed.
 - b. Surfaces covered by furring, wallboard, plaster, stucco, or masonry facings.
 - c. Surfaces above suspended ceilings.
 - d. Surfaces within attic spaces, crawl spaces, pipe or duct chases, elevator shafts or other rooms or spaces not exposed to view.
 - 4. Exposed Masonry Surfaces: Exposed masonry spaces are defined as all other masonry surfaces including those to be painted.

1-02 QUALITY ASSURANCE:

- A. Codes and Standards: Comply with the applicable provisions of the following codes and standards:

1. International Code Council (ICC):
 - a. California Building Code, (CBC), 2010 Edition.
2. American Society for Testing and Materials (ASTM):

C5	Standard Specification for Quicklime for Structural Purposes (Latest Editions)
C39	Method of Test for Compressive Strength of Cylindrical Concrete Specimens
C42	Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
C51	Standard Definitions of Terms Relating to Lime and Limestone
C90	Specification for Hollow Load-Bearing Concrete Masonry Units
C94	Standard Specification for Ready-Mixed Concrete
C109	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 cc Cube Specimens)
C140	Standard Methods of Sampling and Testing Concrete Masonry Units
C143	Standard Method of Test for Slump of Portland Cement Concrete
C144	Specification for Aggregate for Masonry Mortar
C150	Standard Specification for Portland Cement
C207	Standard Specification for Hydrated Lime for Masonry Purposes
C270	Standard Specification for Mortar for Unit Masonry
C404	Standard Specification for Aggregates for Masonry Grout
C426	Standard Test Method for Drying Shrinkage of Concrete Block
C476	Standard Specification for Grout for Reinforced and Non-Reinforced Masonry
D1056	Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
D1667	Standard Specification for Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Closed-Cell Sponge)
D2240	Standard Method of Test for Indentation Hardness of Rubber and Plastics by Means of a Durometer

- E149 Standard Test Method for Bond Strength of Mortar to Masonry
- E329 Recommended Practice for Inspection and Testing Agencies for Concrete Steel, & Bituminous Materials as used in Construction.
- E447 Standard Method of Test for Compressive Strength of Masonry Prisms
- 3. American Concrete Institute (Latest Edition)
 - ACI 318 Building Code Requirements for Reinforced Concrete
- 4. California Concrete Masonry Technical Committee (CCMTC) Quality Control Program.
- 5. Provisions of California Building Code, Title 24, Part 2 are applicable to the work. When requirements of such codes are at variance with requirements specified in foregoing paragraphs, the provisions of T24 shall take precedence.

B. Qualifications of Personnel:

- 1. Throughout progress of the work of this Section, provide at least one person thoroughly familiar with the specification requirements, completely trained and experienced in the necessary skills, and who shall be present at the site and shall direct all work performed under this Section.
- 2. In actual installation of the work of this Section, use adequate numbers of skilled workmen to insure installation in accordance with the approved design and approved recommendations of the manufacturer of the material which is being installed or applied.
- 3. In acceptance or rejection of work performed under this Section, the Architect will make no allowance for lack of skill on the part of workmen.

1-03 SUBMITTALS:

- A. General: Comply with the provisions of Section 01300.
- B. Shop Drawings: Submit the following shop drawings:
 - 1. Complete plan of procedure for high-lift grouting.
 - 2. Plans and details of construction and control joints not shown on the Drawings.
- C. Samples: Submit samples of the following items:
 - 1. One specimen of each class of masonry unit with different dimensions, finishes, textures, and colors.
 - 2. After material samples are reviewed, and prior to starting masonry work, construct sample panels. A sample panel shall be built approximately 4 foot high by 6 foot long. Masonry construction shall not proceed until the sample panel is accepted by the Architect. Full size masonry units which have been selected and reviewed by the Architect to show color range, maximum texture range, bond, tooling of joints and quality of workmanship shall be used in

the sample panel. The sample panel shall remain on the project for comparison purposes with the actual masonry work. Protect the sample panels from the weather and construction operations until the masonry work controlled by the sample panels has been completed and approved. The sample panel shall be demolished and removed from the site after completion and acceptance of the concrete block masonry work.

- D. Certificates of Compliances: The materials listed below shall be certified by the manufacturer for compliance with all specification requirements:
1. Concrete Masonry Units
 2. Control Joint Key
 3. Premolded Expansion Joint Filler
 4. Lime
 5. Mortar Coloring
 6. Cement
- E. Certified Test Results: In addition to the certificates above, submit certified copies of results of the tests listed below. The tests must comply with all provisions of CBC Standards. Tests may have been performed on previously manufactured materials provided the tests were performed on materials manufactured within the last 6 month and the results are accompanied by certificates from the manufacturer stating that the previously tested material is the same type, quality, and manufacture as that proposed for the project.
1. Concrete Masonry Units: Unit weight, linear drying shrinkage, compressive strengths, absorption of each type of unit.
 2. Cement: Certified mill tests reports of each mill lot.
- F. Laboratory Test Reports: The testing laboratory shall submit the results of all tests to the Architect and the Division of the State Architect.
- G. Verified Reports: The testing agency and the specialty masonry inspector shall submit a verified report for the laboratory testing and the special inspection of the masonry work in accordance with Title 24, Part 2.
- H. Grout Mix Designs: The contractor shall submit the proposed grout mix design to the Architect for review prior to placing any grout used in pumped grout or high-lift grout or grout supplied by a ready mixed grout supplier.
- I. Manufacturer's Literature: Submit the manufacturer's literature, test data and installation instructions for the following items:
1. Grout and Mortar admixtures
 2. Mortar coloring

3. Reinforcing bar positioning devices
- J. Delivery Tags: Submit copies of the delivery tags for ready mixed grout.
- K. Testing Laboratory Qualifications: Submit data on the testing laboratory's facilities and qualifications of its principals and key personnel to show conformance with ASTM E329.

1-04 PRODUCT HANDLING:

- A. Delivery: Deliver materials to the job site in an undamaged condition in original sealed containers marked with the name of the manufacturer and the identification of the contents.
- B. Storage:
 1. Cementitious Materials: Store cementitious materials in a manner to prevent deterioration and to exclude moisture and contaminants.
 2. Masonry Units: Store masonry units under waterproof coverings on planking clear of the ground and protect from handling damage, dirt, stain, water and wind.
 3. Aggregates: Store aggregates in manner to avoid contamination, segregation, and mixing with other aggregate size fractions or other materials.
- C. Protection:
 1. Use all means necessary to protect the materials of this Section before, during and after installation, and to protect the work and materials of all other trades.
 2. When rain or snow is imminent, cover the tops of exposed masonry with a strong, non-staining waterproof membrane. Place and secure the membrane in a manner that will prevent moisture from accumulating within the unfinished wall.
 3. When starting or resuming work, clean loose mortar, foreign materials, and water from the top surface of the work.
- D. Replacement: In the event of damage, immediately make all repairs and replacements with new materials at no additional cost to the Owner.

1-05 ENVIRONMENTAL CONDITIONS:

- A. Cold Weather Construction:
 1. General:
 - a. All materials shall be delivered in a usable condition and stored to prevent wetting by capillary action, rain and snow.
 - b. The tops of all walls not enclosed or sheltered shall be covered with a strong weather-resistive material at the end of each day or shutdown.
 - c. Partially completed walls shall be covered at all times when work is not in

progress. Covers shall be draped over the wall and extend a minimum of 2 feet down the sides and shall be securely held in place, except when additional protection is required.

2. Preparation:
 - a. If ice or snow is advertently formed on masonry bed, it shall be thawed by application of heat carefully applied until top surface of the masonry is dry to the touch.
 - b. A section of masonry deemed frozen and damaged shall be removed before continuing construction of that section.
3. Construction: No masonry shall be laid when the temperature of the outside air is below 40 deg. F unless approved methods are used during the construction to prevent damage to the masonry. Masonry units shall be dry. Wet or frozen units shall not be laid. Provide at least the following construction procedures depending on air temperature:

<u>Air Temperature</u>	<u>Construction Procedures</u>
40 deg. F and below	Sand or mixing water shall be heated to produce mortar temperatures between 40 deg. F and 120 deg. F.
32 deg. F and below	Maintain temperatures of mortar on boards above freezing.
25 deg. F to 20 Deg. F.	Heat sources shall be provided on both sides of walls under construction. Wind breaks shall be employed when wind is in excess of 15 mph.
20 Deg. F and below	Enclosures and auxiliary heat shall be provided to maintain air temperature above 32 deg. F. Temperature of units when laid shall not be less than 20 deg. F.

4. Protection: Provide at least the following protection measures when the air temperature falls below 40 deg. F:

<u>Air Temperature</u>	<u>Protective Measures</u>
40 deg. F to 32 deg. F	Masonry shall be protected from rain or snow for 48 hours by covering with weather-resistive membrane.
32 deg. F to 25 deg. F	Masonry shall be completely covered with a weather resistive membrane for 48 hours.
25 deg. F to 20 deg. F	Masonry shall be completely covered with insulating blankets or equal protection for 48 hours.
20 deg. F and below	Masonry temperature shall be maintained above 32 deg. F for 48 hours by enclosure and supplemental heat by electric heating blankets, infrared heat lamps, or other approved methods.

5. Placing Grout and Protection of Grouted Masonry:
 - a. When air temperatures fall below 40 deg. F, grout mixing water and aggregate shall be heated to produce grout temperatures between 40 deg. F and 120 deg. F.
 - b. Masonry to be grouted shall be maintained above freezing during grout placement and for at least 24 hours after placement.
 - c. No grout shall be placed when the atmospheric temperature falls below 20 deg. F.

B. Hot-Weather Construction:

1. When the ambient air has a temperature of more than 99° F., or 90 deg. F with a wind velocity greater than 8 mph, protect newly erected masonry from direct exposure to wind and sun for 48 hours after installation. Provide the following special methods to prevent too rapid curing of the mortar:
 - a. Mortar shall be kept moist and shall not be spread more than 4 feet ahead of the units being placed. Set masonry units within one minute of spreading mortar.
 - b. After the units are in place apply a very light fog spray several times during the first 24 hours to give the mortar time to cure properly before it dries out.

PART 2: PRODUCTS

2-01 MATERIALS:

A. Concrete Masonry Units:

1. Hollow Load Bearing Units:

- a. Type: Conform to the requirements of ASTM C90, and CBC Standards Grade N, Type I except as modified herein.
- b. Color: Furnish integral color(s) as follows:
 1. Color: The same mineral pigment as used to produce the concrete block shall be pre-weighed to an accuracy of plus or minus 1% of the weight of the weight of the pigment used to produce a color sample acceptable and approved by the Architect.
- c. Sizes, Shapes and Dimensions: Comply with the dimensional requirements of ASTM C90, except that the requirements for equivalent web thickness shall not apply to single and double open end units. Provide shapes and sizes as noted on the Drawings. Unless, otherwise noted, the units shall have nominal dimensions of 8x8x16 inches, split-face one side.
- d. Weight: Units shall be lightweight units with a maximum oven dried weight of 105 pcf.

- e. Linear Shrinkage: Concrete masonry units shall have a maximum linear shrinkage of .06% from the saturated to the oven dried condition when tested in accordance with ASTM C426.
 - f. Moisture condition: When delivered to the site, the concrete masonry units shall not exceed the maximum moisture content given in ASTM C90 for intermediate regions.
 - g. Compressive Strength: The average ultimate compressive strength of three masonry units shall be not less than 1000 pounds per square inch on the gross area and 2000 pounds per square inch on the net area when tested in accordance with ASTM C140.
2. Solid Load Bearing Concrete: Conform to ASTM C90, Type N-I lightweight units.
- B. Cement:
- 1. Portland Cement: Portland cement for mortar and grout shall conform to ASTM C150 Type I or II including the requirements for low alkali content.
- C. Water:
- 1. Water used in mixing mortar and grout shall be clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to the masonry or reinforcement.
 - 2. Nonpotable water shall not be used in mortar or grout unless the following are satisfied:
 - a. Selection of mortar and grout proportions shall be based on mixes using water from the same source.
 - b. Mortar test cubes made with nonpotable mixing water shall have 7-day and 28-day strengths equal to at least 90 percent of strengths of similar specimens made with potable water. Strength test comparison shall be made on mortars, identical except for the mixing water, prepared and tested in accordance with ASTM C109.
- D. Aggregate:
- 1. General: Aggregate shall be clean, sharp, and well graded, and free from injurious amounts of dust, lumps, shale, surface coatings and organic matter.
 - 2. Aggregates for Mortar: Aggregates for mortar shall be washed sand conforming to ASTM C144, with at least 5% passing the No. 200 sieve.
 - 3. Fine Aggregates for Grout: Fine aggregates for grout shall conform to ASTM C404, with the grading requirements for size No. 1.
 - 4. Coarse Aggregates for Grout: Coarse aggregates for grout shall conform to ASTM C404 with the grading requirements for size No. 8, except 100 percent shall pass the three-eighths inch sieve and not more than 5 percent shall pass the No. 8 sieve.

E. Lime:

1. Hydrated Lime: Conform to ASTM C207, Type S.
2. Quicklime: Conform to ASTM C5. Quicklime shall be slaked and screened through a 16-mesh sieve. After slaking, screening, and before using it shall be stored and protected for not less than 10 days. The resulting product shall weigh not less than 83 pounds per cubic foot.
3. Processed Pulverized quicklime: Conform to ASTM C51. It shall be slaked for not less than 48 hours and shall be cool when used.
4. Lime Putty: Lime putty shall be made from quicklime or hydrated lime.

F. Admixtures:

1. The use of admixtures shall not be permitted in mortar or grout unless reviewed by the Architect.
2. The use of admixtures shall not be permitted in mortar without reducing the lime content.
3. A grout admixture of a type that reduces early water loss to the masonry units and produces an expansive action in the plastic grout sufficient to offset initial shrinkage and promote bonding of the grout to all interior surfaces of the masonry units shall be used.
4. Antifreeze compounds shall not be used.
5. Admixtures shall not contain calcium chloride salts or any other chemical that will adversely affect metals or the coatings of metals embedded in the mortar or grout.

G. Mortar Coloring:

1. General: Use only pure inert mineral oxide pigments or carbon black.
2. Approvals: The quality and quantity of the pigment shall be reviewed by the Architect.

H. Control Joint Fillers:

1. Use prefabricated control joint fillers of factory-fabricated solid sections of natural or synthetic rubber, combination thereof, other rubber-like material, or other acceptable material.
2. Durometer hardness shall be not less than 70 when tested in conformance with ASTM D2240.
3. The material shall be resistant to oils and solvents and shall remain flexible at a temperature of minus 40 degrees after exposure for 5 hours.
4. Use key of shape indicated and of dimensions that completely fill and fit neatly, without forcing, in masonry unit jamb sash grooves and provide control joint width of 3/8 in. with tolerance of 1/16 in.

5. Use shear section of 5/8 in. minimum thickness.
- I. Expansion Joint Material: Use closed cell cellular rubber conforming to ASTM D1056, grade number SCE 41 or SCE 42 or closed cell vinyl or polyvinyl chloride conforming to ASTM D1667, grade number VE41 or VE42. Compression set, at 50 percent deflection, shall not exceed 15 percent. The material shall pass the low temperature test prescribed in the reference specification under which the material is furnished.
- J. Anchors, Ties, and Centering Devices: Fabricate from corrosion resistant steel, with minimum tensile yield of 30,000 psi.

2-02 MIXES:

- A. Mortar:
 1. Proportions: Mortar shall conform to the proportion specifications of Type S mortar in accordance with ASTM C270.
 2. Strength: Mortar shall attain a minimum compressive strength of 1500 pounds per square inch at 28 days when field sampled in accordance with CBC Standards and laboratory tested in accordance with the applicable provisions of ASTM C39. The mortar shall attain a minimum compressive strength of 1800 pounds per square inch when tested in accordance with ASTM C270.
 3. Flow: The mortar shall have a flow, after suction, of 70% or more when tested for water retention in accordance with ASTM C270, except mortar shall be mixed to an initial flow of 125 to 135 percent.
 4. Color:
 - a. Use natural color mortar unless otherwise specified. the color of cement and sand used in mortar for exposed work shall produce without the addition of any coloring agent, a uniform shade.
 - b. When special mortar coloring is required, proportions shall meet the following criteria:
 - (1) For job site pigmented mortar use mineral pigments, and with exception of carbon black, limit to 10 percent by weight of cement content.
 - (2) Limit water soluble matter to 1 percent of cement content, and carbon black to 2 percent of cement content.
- B. Grout:
 1. General: Proportions of ingredients and any additives shall be based on laboratory or field experience with the grout ingredients and the masonry units to be used. If laboratory or field experience is not available, grout shall be proportioned by volume to conform to the requirements of ASTM C476 for coarse grout.

2. Strength: Grout shall attain a minimum 28 day compressive strength of 2000 psi when sampled in accordance with CBC Standards and tested in accordance with the applicable provisions of ASTM C39.
3. Consistency: Add sufficient water to make the grout a fluid consistency for pouring or pumping without segregation of the component parts. The grout shall have a slump of nine (9) inches with a tolerance of plus or minus one (1) inch, when measured in accordance with ASTM C143.
 - a. The grout shall contain not less than 7 sacks of cement in each cubic yard of fluid grout.
4. Mix Designs:
 - a. Requirements: The contractor shall submit the proposed grout mix design to the Architect for review.
 - b. Design Criteria:
 - (1) Proportion and design the grout to develop the stipulated minimum ultimate compressive strength at twenty-eight days. Proportions based on laboratory or field experience shall conform to the similar requirements for concrete as given in ACI 318, Chapter 5.
 - (2) Where different materials are to be used for different portions of the work, each combination shall be evaluated separately.
 - (3) The contractor shall submit the grout mix designs to the Architect for review prior to placing any grout.
 - (4) The grout mix design shall be prepared by an independent testing laboratory and shall be signed by a civil engineer registered in California.
 - (5) The mix design shall be based on recent materials data, tested by an approved testing laboratory within the past six months.
 - (6) If the source or character of the aggregate or cement changes during the course of the work, the contractor shall resubmit a new mix design for review.
 - c. Submittal: The grout mix design submitted to the Architect shall include, but not necessarily be limited to the following:
 - (1) Aggregate source, type and maximum size.
 - (2) Aggregate sieve analysis
 - (3) Tests for aggregate soundness, deleterious substances and organic impurities.
 - (4) Moisture content of fine aggregate.

- (5) Aggregate specific gravity and unit weight.
- (6) Weights of aggregate (saturated surface dry condition and stockpiled condition) weight of cement, and volume (or weight) of water.
- (7) Type and source of cement.
- (8) Admixture type and proportions.
- (9) Maximum permissible slump.
- (10) Design compressive strength at 28 days.

PART 3: EXECUTION

3-01 PREPARATION:

- A. Layout: Make layout in accordance with project drawings.
- B. Cleaning: Remove laitance, loose aggregate, and anything that prevents mortar from bonding to foundation. The contact surface must be thoroughly cleaned by chipping or sand blasting the entire surface or by an approved method that will assure equal bond such as a thorough hose washing of the surface not less than two or more than four hours after the concrete is placed (depending on setting time), with all wash water and chalk-like material being entirely cleaned from the surface.
- C. Tolerances: Do not proceed with masonry construction, when the following foundation tolerances are not met:

Horizontal alignment (Variation from plan dimension)	$\pm 1/4"$ in 10 ft. 1/2" max. variation
Vertical alignment (Variation from level)	$\pm 1/4"$ in 10 ft 1/2" in max. variation

3-02 MORTAR MIXING:

- A. Measurements: Measure materials with suitable calibrated devices so that the specified proportions are controlled and maintained. Shovel measurements are not acceptable.
- B. Mixers: Mix ingredients in a paddle type power driven mixer.
- C. Sequence:
 - 1. Place approximately one-half the required water and sand into the mixer while running.
 - 2. Add cement, color (if required), and the remainder of the sand and water into the mixer in that order and mix for a period of 3 minutes.
 - 3. Add lime and continue mixing as long as needed to secure a uniform mass.

4. In no case shall the total mixing time be more than 10 minutes.
- D. Consistency: Make consistency of mortar on the board such that it can be worked with the trowel. Water for tempering shall be available on scaffold at all times.
- E. Tempering:
1. Temper the mortar with water as often as required to maintain its high plasticity.
 2. Retemper only by adding water in a basin made with mortar and work mortar carefully into it. Retempering by dashing water over mortar shall not be permitted.
 3. Do not permit mortar to stand more than 1/2 hour without retempering.
 4. Discard mortar which has begun to set or is not used within one and one-half hours after initial mixing.
- F. Colored Mortar: Mix colored mortar to produce uniform color throughout. Mix trial batches, dry, and establish the color by sample panels as specified.

3-03 PLACING MASONRY UNITS:

- A. Construct concrete masonry plumb, true to line, with level courses built to height, thickness, and bond pattern required. Use concrete masonry units that are sound, dry, clean, and free from dust, dirt, ice and frost when placed.
- B. Adjust each unit to final position while mortar is still soft and plastic. Remove any unit disturbed after mortar has stiffened, and re-lay with fresh mortar.
- C. Align vertical cells to be filled with grout to maintain a clear, unobstructed (by reinforcement or other elements), provide a continuous vertical cell measuring not less than 2 inches by 3 inches, except the minimum cell dimension for high lift grout shall be 3 inches.
- D. Proper masonry units shall be used to provide for windows, doors, bond beams, lintels, pilasters and similar elements, with a minimum of cutting.
- E. Unless otherwise noted, the units shall be laid up in straight uniform courses with regular running bond.
- F. The masonry units shall be cut accurately to fit all plumbing, ducts, opening, electrical work, etc., and all holes shall be neatly patched.
- G. Wherever possible, use full units of the proper size in lieu of cut units. Cutting and fitting, including that required to accommodate the work of others shall be done by masonry mechanics using power masonry saws. Concrete masonry units may be either wet or dry cut. Wet cut units, before being placed in the work, shall be dried to the same surface-dry appearance as uncut units being laid in the wall. Cut edges shall be clean, true and sharp. Make openings carefully so that wall plates, cover plates or escutcheons required by the installation will completely conceal the openings and will have bottoms aligned with the masonry joints. Cut webs of hollow masonry units to the minimum required for proper installation.

- H. Allow sufficient time between lifts in hollow masonry units to preclude blowouts of finned ends. If blowouts, misalignment, or cracking of face-shells should occur during construction, tear down and re-build the wall at no additional cost to the Owner.
- I. Where stack bond is used, open end type units shall be used.
- J. Horizontal reinforcement shall be placed in bond beam units with a minimum grout cover of 1 inch above the steel. The depth of the bond beam channel below the top of the unit shall be a minimum of 1-1/2 inch and the width shall be 3 inch minimum.
- K. Concrete masonry units shall not be wetted before placing.

3-04 CONSTRUCTION TOLERANCES:

- A. Lay masonry plumb, true to line, with courses level.
- B. Bond pattern shall be kept plumb throughout.
- C. Construct masonry within the following tolerances:
 - 1. Dimension of elements:
 - a. In cross section or elevation -1/4 in., +1/2 in.
 - b. Mortar joint thickness
 - (1) Bed ±1/8 in.
 - (2) Head -1/4 in., +3/8 in.
 - (3) Collar -1/4 in., +3/8 in.
 - c. Grout space or cavity width -1/4 in., + 3/8 in.
 - 2. Elements:
 - a. Variation from level:
 - (1) Bed Joints ±1/4 in. in 10 ft.; ±1/2 in. max.
 - (2) Top of bearing walls ±1/4 in. in 10 ft.; ±2 in. max.
 - b. Variation from plumb: ±4 in. in 10 ft; ±3/8 in. in 20 ft.; ±1/2 in. max.
 - c. True to a line: ±1/4 in. in 10 ft.; ±3/8 in. in 20 ft.; ±1/2 in. max.

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| d. | Alignment of columns | $\pm 1/2$ in. for bearing walls;
$\pm 3/4$ in. for non-bearing walls. |
| 3. Location of elements: | | |
| a. | Indicated in plan | $\pm 1/2$ in. in 20 ft.; $\pm 3/4$ in. max. |
| b. | Indicated in elevation | $\pm 1/4$ in. in story height;
$\pm 3/4$ in. max. |

3-05 MORTAR JOINTS:

- A. Mortar Bedding (Horizontal Joints):
1. Full Mortar Bedding: Hollow masonry units shall be placed with full mortar coverage on the face shells and cross webs under the following circumstances:
 - a. The starting course on foundations and/or slabs.
 - b. Around cells to be filled with grout. (Applies when only those cells with reinforcement are to be grouted, so as to prevent the leakage of grout).
 - c. All courses of piers, columns and pilasters.
 2. Face Shell Mortar Bedding:
 - a. Masonry units may be placed with mortar coverage only on the face shell when the unit does not require full mortar bedding as stated above.
- B. Head Joints (End Vertical Joints): Place hollow units with head joints tightly mortar bedded for a minimum depth from each face equal to the masonry unit face shell thickness. Shove vertical head joints tightly into place.
- C. Solid Units: Place solid units with full head and bed joints. Bed joints shall not be furrowed.
- D. Thickness: Make horizontal and vertical face joints $3/8$ in. thick unless otherwise required. Initial bed joint thickness shall not be less than $1/4$ inch nor more than $3/4$ inch. Subsequent bed joints shall not be less than $1/4$ inch nor more than $5/8$ inch.
- E. Joint Finish: Mortar joints shall be finished as follows:
1. Flush Joints: Joints in concealed masonry surfaces, and joints above electrical outlet boxes in wet areas shall be flushcut. Make flush joints by cutting off the mortar flush with the face of the wall and then sack the joint to produce a dense surface without sheen. Joints in unparged masonry walls below grade shall be pointed tight.
 2. Tooled Joints: Joints in exposed exterior and interior masonry shall be tooled with a round bar (or "V" shaped bar) to produce a dense, slightly concave surface well bonded to the masonry at its edges. Tool joints when the joints are thumbprint hard. Tool horizontal joints

first. Use a jointer of sufficient length to obtain a straight and true mortar joint.

3. Raked Joints: In exposed exterior masonry surfaces, rake control joints constructed with mortar, dummy joints in bond beams and joints between door frames and abutting masonry walls to a depth of 3/4 inch ready for caulking. In exposed interior masonry surfaces, rake control joints constructed with mortar to a depth of 1/2 inch. On the interior side of exterior door frames, rake joints between door frames and abutting masonry walls to a depth of 3/8 inch.

- F. Flashing: Do not insert through wall flashing or other elements which stop bond in masonry joints between mortar and masonry units, unless otherwise acceptable.

3-06 REINFORCEMENT:

- A. General: Refer to Section 03200 for general requirements.
- B. Grouting: All reinforcement shall be fully embedded in grout.
- C. Horizontal Reinforcement: Horizontal reinforcement shall be laid in bond beam units as the work progresses and securely wired to the vertical reinforcement or shall be held in position by mechanical devices.
- D. Vertical Reinforcement:
 1. Vertical reinforcement shall be placed before the work begins and shall be held in position using metal supports, centering clips, spacers, wire ties, or caging devices at the top and bottom and at intervals not exceeding 200 bar diameters or ten (10) feet whichever is less.
 2. Vertical reinforcement may be placed after the units are installed but prior to grouting provided that suitable mechanical devices are installed to maintain the bars in their proper position.
 3. Full length vertical bars installed prior to laying the masonry units shall be held in position to prevent them from waving due to wind or external vibration.
 4. Vertical reinforcement shall be secured to the dowels arising out of the foundation and/or slab unless suitable mechanical positioning devices are provided.
- E. Bending: Where dowels arising out of the foundation and/or slab do not align with the proper position of the vertical reinforcement they may be bent at a slope not exceeding one horizontal to six vertical. Dowels not conforming to the required position after bending at this maximum offset shall be replaced at the direction of the Architect.
- F. Tolerances:
 1. For walls, columns, beams and other flexural elements, the reinforcement shall be placed to the following tolerances where "d" is the distance from the centerline of the steel to the opposite face of the masonry.
 - a. ± 0.5 inch for "d" less than or equal to 8 inch.

- b. ± 1 inch for "d" less than or equal to 24 inch.
 - c. ± 1.25 inch for "d" greater than 24".
2. Tolerance for longitudinal location of reinforcement shall be plus or minus 2 inch.

3-07 GROUTING:

A. Mixing:

1. General: All grout shall be mixed until there is a uniform distribution of materials and shall be discharged completely before the mixer is recharged.
2. Ready-Mixed Grout: Ready-mixed grout shall be batched, mixed, and transported in accordance with ASTM C94.
3. Job Mixed Grout: Mix components in a drum type power mixer for a period of at least 5 minutes. Measure materials with suitable calibrated devices so that the specified proportions are controlled and maintained.

B. Grouting Equipment:

1. Grout Pumps: Pumping through aluminum tubes will not be permitted. Operate pumps to produce a continuous stream of grout without air pockets. Upon completion of each days pumping, eject grout from pipeline without contamination or segregation of the grout. Remove waste materials and debris from the equipment. Dispose of waste materials, debris and all flushing water outside the limits of the masonry.
2. Vibrators: Internal vibrators shall maintain a speed of not less than 5,000 impulses per minute when submerged in the grout. Maintain at least one spare vibrator, or sufficient parts for repairing vibrators, at the site at all times. Apply vibrators at uniformly spaced points not further apart than the visible effectiveness of the machine. Limit duration of vibration to time necessary to produce satisfactory consolidation without causing segregation.

C. Conveying:

1. Place grout using a hand bucket, concrete hopper or grout pump. Place grout so as to completely fill the grout spaces without segregation of the aggregates and to minimize grout splatter on the reinforcing and masonry unit surfaces not immediately encased in the grout lift.
2. Place grout in final position within 1-1/2 hours after mixing.

D. Grout Holes: Provide grouting holes in slabs, beams, closed masonry units and in other elements that would otherwise conceal the grout space. Locate holes over vertical reinforcing bars. Provide additional opening spaced not more than 16 inches on centers where grouting of all hollow unit masonry is indicated. Openings shall not be less than 4 inches in diameter or 3 by 4 inches in horizontal dimensions. Upon completion of grouting operations, plug grouting holes and finish to match surrounding surfaces.

E. Consolidation: Grout pours greater than 12 inches shall be consolidated by mechanical vibration.

Grout not mechanically vibrated shall be puddled. Grout shall be consolidated during placement and reconsolidated after excess moisture has been absorbed, but before workability is lost, to minimize voids due to water loss.

- F. Construction Joints: When grouting is stopped for one hour or longer horizontal construction joints shall be formed by stopping the pour of grout 1.5 inch below a mortar joint. Where bond beams occur, stop grout pour a minimum of 1/2 inch below the top of the masonry. Horizontal steel shall be fully embedded in grout in an uninterrupted pour with at least 1 inch grout coverage.
- G. Grouting Beams: Grout beams over openings in one continuous operation.
- H. Bolts: All bolts, anchors and similar devices shall be solid grouted in place.
- I. Prior to grouting, the grout space shall be clean so that all spaces to be filled do not contain mortar projections greater than 1/4 inch, mortar droppings and other foreign materials.
- J. All cells shall be grouted solid.
- K. Grout Placement: Grout shall be placed by pumping or other approved methods using the procedures and requirements given under one of the two following methods:
 - 1. Low Lift Grouting:
 - a. In hollow unit masonry construction limit low-lift grouting to maximum height of two feet per lift. Units shall be laid to a maximum of two feet before grouting.
 - b. Vertical cells to be filled shall have vertical alignment sufficient to maintain a clear, unobstructed continuous cell measuring not less than 2 inches by 3 inches.
 - c. The bottom surface inside cells to be grouted shall be free from mortar so that the grout will bond.
 - 2. High-Lift Grouting:
 - a. Cleanouts: Cleanout openings shall be provided through the block faces at the bottom of all cells with vertical bars but not spaced more than 32" on center for solidly grouted masonry. The cleanout openings shall be of sufficient size (12 sq. inches minimum) and location to permit flushing away of mortar droppings and debris. Establish a new series of cleanouts if grouting operations are stopped for more than 4 hours.
 - b. Cleaning: All mortar droppings and overhangs shall be removed from the foundation or bearing surface, cell walls and reinforcing. Acceptable methods to clean the various surfaces are:
 - (1) Hosing with a jet stream of water at least twice a day (mid-day and at quitting time)
 - (2) Providing a two to three inch blanket of dry sand over the exposed surface of the foundation and removing prior to grouting.

- (3) Dislodging any hardened mortar from the cell walls and reinforcing with a pole or rod and subsequent cleaning with a jet stream of water.
- c. Inspection: The cells and the reinforcement, and embedded items shall be inspected prior to sealing the cleanout openings.
- d. Cleanout Closure: The cleanout openings shall be closed by inserting face shells of masonry units or covering the openings with forms prior to grouting. Face shell plugs shall be mortared into position and shall have a 48 hour minimum curing time. The face shell plugs shall be adequately braced to resist the pressure of the fluid grout. Face shell plugs shall be used when the cleanout openings will be exposed to view. Face shell plugs and mortar exposed to view shall match the adjacent texture and color.
- e. Depositing:
 - (1) Limitations:
 - (a) Length of Pour: The length of the pour shall be limited to a length in which successive lifts can be placed within one hour of the preceding lift.
 - (b) Area of Pour: The area of the pour shall be limited to an area that can be placed in one continuous pour to the top of the wall in successive lifts in the same day. The high-lift grouting of any section of wall between lateral flow barriers shall be completed to the top of a pour in one working day unless a new series of cleanout holes is established and the resulting horizontal construction joint cleaned.
 - (c) Height of Pour: The maximum height of each pour shall be limited to twelve feet for eight inch walls and 16 feet for twelve inch walls.
 - (d) Height of Lift: The maximum height of each lift shall be limited to four (4) feet.
- 3. Mortar Curing: Do not place grout until mortar joints have set for at least 24 hours. However, the walls shall be grouted as soon as possible after the mortar has cured to reduce shrinkage cracking of the vertical joints.
- 4. Sequence of Operations: The first lift shall be placed to a uniform height and consolidated. A waiting period of thirty (30) to sixty (60) minutes shall occur between succeeding lifts to allow the grout to become plastic but without taking any set, and successive lifts shall be poured to a uniform height. The preceding lift shall be reconsolidated. The process of waiting, pouring and reconsolidating shall be repeated to the top of the wall. The final lift shall be reconsolidated and grout added as required to fill all voids.
- 5. Vertical Construction Joints: Vertical construction joint locations shall be reviewed by the Architect.

6. Consolidation: Each lift shall be consolidated by mechanical vibrators. Alternate cells shall be vibrated 12 to 18 inches into the preceding lift in such a manner to reconsolidate the preceding lift and close any plastic shrinkage cracks or separations from the cell walls. The top lift shall be reconsolidated after the grout has become plastic but before the grout has taken any set. The space left by settlement shrinkage shall be filled with grout. The vibrators shall follow at the same pace as the grout placement. Adequate numbers of vibrators and vibrator operators shall be available at the site.

3-08 FORMS AND SHORES:

- A. General: Where required, construct forms to the shapes, lines and dimensions of the members indicated.
- B. Design: The design of forms and shores shall be the responsibility of the contractor.
- C. Horizontal Bracing: Temporarily brace masonry against horizontal loads until the masonry has cured and it is permanently braced.
- D. Construction: Construct forms sufficiently rigid to prevent deflections which may result in cracking or other damage to the supported masonry and construct forms sufficiently tight to prevent leakage of mortar and grout.
- E. Removal: Do not remove supporting forms and shores until the supported masonry has acquired sufficient strength to support safely its weight and any construction loads to which it may be subjected. In no case shall the supporting forms or shores be removed in less than 10 days. At least 16 hours shall have elapsed after grouting masonry columns and walls before applying uniform loads and an additional 48 hours shall have elapsed before applying concentrated loads.

3-09 CONSTRUCTION PROTECTION:

- A. Do not permit water or foreign material to fall in grout space while grout is being placed and curing.
- B. Protect sills, ledges, and offsets from mortar drippings and other damage during construction.
- C. Remove misplaced mortar and grout immediately and clean affected areas.
- D. Protect face material from staining. Keep masonry units dry. Keep the top of masonry construction covered with a waterproof covering when work is not in progress.

3-10 EMBEDDED ITEMS:

- A. Pipes and Conduits:
 1. Rigid electrical conduits may be embedded in the grouted cells only when their location has been detailed on the drawings.
 2. Any pipe or conduit may pass horizontally through any masonry by means of a sleeve or cored hole at least large enough to pass any hub or coupling on the pipe line. Such sleeves shall be placed not closer than three diameters, center to center, nor shall they impair the strength of the construction. Such sleeves not exposed to rusting or other deterioration, shall

conform to ASTM A53, and shall be solidly grouted or mortared in place.

3. All embedded items shall be securely anchored against movement prior to grouting.

B. Anchor Bolts:

1. All bolts shall be accurately set into the masonry as the work progresses and held in position prior to grouting.
2. All bolts which are embedded in masonry shall be grouted in place with not less than one inch of grout between the bolt and the masonry unit.

C. Miscellaneous Items:

1. Fill spaces around metal door frames and other built-in items with mortar.
2. Openings around flush mounted electrical outlet boxes in wet locations, including the flush joint above the box shall be pointed with mortar.
3. Wall plugs, accessories, flashings, pipe sleeves and other items required to be built-in shall be built-in as the masonry work progresses.

3-11 CURING:

- A. The tops and sides of the masonry work shall be kept damp to prevent too rapid drying during hot weather or wind.

3-12 QUALITY CONTROL:

A. General:

1. Masonry materials and operations shall be continuously inspected during laying and grouting by an inspector specially approved for that purpose by the Architect and the Office of the State Architect. Failure to detect any defective work or materials shall not in any way prevent later rejection when such defect is discovered nor shall it obligate the Architect for final acceptance.
2. The Architect and the Office of the State Architect shall have the right to order the testing of any materials used in the masonry construction to determine if they are of the quality specified.
3. Forward all test and inspection reports to the Architect and DSA.

B. Testing and Inspection Agencies:

1. The required inspection services shall be performed by the approved special masonry inspector.
2. The necessary testing services shall be performed by a testing agency acceptable to the Architect.

3. The testing agency shall meet the requirements of ASTM E329.
- C. Testing and Inspection Services: The following testing and inspection services shall be performed:
1. Inspection Requirements: The special masonry inspector shall be at the site during all masonry construction and perform the following duties:
 - a. Review plans and specifications and meet with the Contractor to discuss requirements before work commences.
 - b. Insure that masonry units, reinforcement, cement, lime, aggregate, and all other materials meet the requirements of the applicable standards of quality and that they are properly stored and prepared for use.
 - c. Check brand and type of cement, lime (if used) and source of sand. Obtain and forward certificates of compliance to Architect.
 - d. Inspect the foundation to ascertain that it is clean and ready to receive units.
 - e. Observe proportioning of mortar and field mixed grout and visually check aggregate to determine uniformity of grading, cleanliness and moisture.
 - f. Observe manner in which units are laid up to insure that joints are full of mortar and kept tight during work. Inspect grout cells to assure that fins will not interfere with grouting. Instruct masons to keep grout cells clean of mortar droppings and inspect to determine compliance.
 - g. Observe placement of reinforcement, including verification of size, spacing, location and splicing.
 - h. Inspect the cells, reinforcement and embedded items prior to sealing the high lift cleanout openings.
 - i. Observe placing of grout continuously.
 - j. Coordinate material testing with the Contractors operations.
 - k. Verify that construction details, procedures, and workmanship are in accordance with plans and specifications.
 - l. Verify submittals and approval of certificates of conformance, certified test reports, manufacturer's literature, samples mix designs and shop drawings prior to proceeding with the work.
 2. Preconstruction Testing: The following materials shall be sampled by the special masonry inspector and tested by the approved testing agency prior to commencing any masonry work. Tests shall be scheduled far enough in advance of starting masonry work to permit retesting if necessary.
 - a. Aggregates: Sample and test grout and mortar aggregates for deleterious substances, organic impurities, soundness and grading in accordance with ASTM

C144 and ASTM C404.

- b. Masonry Units: Sample prior to delivery in accordance with ASTM C140. The number of samples shall be in accordance with ASTM C140. Test for Compressive Strength, Absorbtion, Unit Weight and Moisture Content in accordance with ASTM C140. Test for Drying Shrinkage in accordance with ASTM C426. Tag acceptable units for shipment.
 - c. Mortar Admixtures: When it is proposed to use a mortar admixture, test reports indicating the advantages to result shall be submitted. Six test specimens shall be made from the mortar containing admixture. The mortar used in this testing shall be identical except for the admixture, shall be designed and mixed from identically graded aggregates and from the same brand and type of cement, in strict conformance to the properties specified hereinbefore for mortar. The mortar with and without the admixture shall have the same aggregate ratio, water retention, and compressive strength as stipulated. Admixture shall be used in conformance with the manufacturer's recommendations. Each of the mortars shall be tested for water retention and compressive strength in conformance with ASTM C270.
3. Field Quality Control Tests: Samples specified herein shall be taken at random locations by the special masonry inspector and tested by the approved testing agency so as to correctly reflect the work and/or material throughout the project:
- a. Mortar:
 - (1) Sampling: Field sample mortar specimens in accordance with CBC Standards. Mortar samples shall be taken from the unit soon after spreading. After molding, the molds shall be carefully protected by a covering which shall be kept damp for at least 24 hours.
 - (2) Testing: Cap and test the specimens in a condition in accordance with the applicable provisions of ASTM C39.
 - (3) Frequency: Take three specimens each day that mortar is placed. Test one specimen at age 7 days, and test two specimens at age 28 days. The specimens shall be taken randomly throughout the course of the day's work. After the initial 3 days of work the mortar specimens may be taken weekly. Additional samples shall be taken when any change in materials or job conditions occur, or whenever in the judgement of the Architect, such tests are necessary to determine the quality of the material.
 - b. Grout:
 - (1) Sampling: Field sample grout specimens in accordance with CBC Standards. The masonry unit molds shall be broken away after the grout has taken its set, but before it has hardened. If an absorbent paper liner is used, the mold may be left in place until the specimen is hardened.
 - (2) Testing: Cap and test the specimens in a damp condition in accordance with the applicable provisions of ASTM C39. Test the specimens in the vertical position.

- (3) Frequency: Take at least three specimens for each 30 cy of grout (or fraction thereof) that is placed each day for three successive working days, and at least one week intervals thereafter. Test one specimen at age 7 days and test two specimens at age 28 days. The specimens shall be taken randomly throughout the course of the day's work.
- c. Moisture Condition of Masonry Units:
 - (1) Sampling and Testing: Conform to ASTM C140.
 - (2) Frequency: Take 3 specimens during the progress of the work for each 5000 square feet of wall area (or fraction thereof) and at such times deemed necessary by the Architect, or specialty masonry inspector.
- d. Compression Tests of Unit Masonry:
 - (1) Sampling and Testing: Conform to ASTM C140.
 - (2) Frequency: Take 3 specimens during the progress of the work for each 5000 square feet of wall area (or fraction thereof).
- 4. Batch Plant Inspection:
 - a. On the first half day transit mixed grout is supplied to the job, and at such other times as may be required by the Architect, the quantity and quality of materials used in the transit mixed grout shall be continuously checked by the specialty masonry inspector at the batch plant location.
 - b. A licensed weighmaster shall certify to each load on a load ticket transmitted to the specialty masonry inspector on all grout transported to the project and shall furnish an affidavit at the completion of the project.
- 5. Core Tests:
 - a. The testing agency shall take not less than two cores from each project. At least one core shall be taken from each masonry structure for each 5000 square feet of floor area or fraction thereof.
 - b. Cores shall be taken at representative places throughout the structure as designated by the Architect or the Project Inspector.
 - c. The cores shall be examined to ascertain if the joints and voids are filled.
 - d. Cores having a diameter of approximately two-thirds the wall thickness, but not less than 4 inches, shall be obtained and tested in accordance with ASTM C42, except that the cores shall be air dried (temperature 60 to 80°F, relative humidity less than 60%) for 7 days before test and shall be tested dry.
 - e. One-half the number of cores shall be tested in shear. The shear loading shall test both joints between the grout core and the outside webs of masonry. The unit shear

on the cross section shall be not less than $2.5(f'_m)^{1/2}$ psi. The shear testing apparatus shall be approved by the Architect.

- f. One half the number of cores shall be tested in compression. The cores shall show a compressive strength of f_m , but not less than 1500 pounds per square inch.
- g. The testing and inspection agency shall prepare a report of the coring operations and core tests. The report shall indicate the total number of cores cut, the location, the condition, and the strength of all cores cut on the project, regardless of whether or not the core specimens failed during the cutting operation.
- h. Fill all core holes with face shells and mortar to match the adjacent surface.

6. Reports:

- a. The testing and inspection agency shall report all test and inspection results to the Architect and Contractor immediately after they are performed.
- b. When it appears that any material furnished or work performed by the contractor fails to fulfill specification requirements, the testing agency shall report such deficiency to the Architect and the contractor.
- c. All test reports shall include the exact location in the work at which the batch represented by a test was deposited.
- d. Reports of strength tests shall include detailed information on storage and curing of specimens prior to testing.
- e. Maintain a daily diary of tests and inspections and submit to Architect on a weekly basis.
- f. Conform to the applicable requirements of ASTM E329.
- g. The special masonry inspector shall submit a verified report to the Architect and the Office of the State Architect that of his own person knowledge the masonry work and all testing during the period covered by the report has been performed and materials have been used and installed in every material respect in compliance with the duly approved plans and specifications.

D. Responsibilities and Duties of Contractor:

- 1. When required by this section, the contractor shall submit to the Architect the grout materials and the grout mix designs proposed for use. This submittal shall include the results of all testing performed to qualify the materials and to establish the mix designs. No grout shall be placed in the work until the mix has been reviewed by the Architect.
- 2. To facilitate testing and inspection, the contractor shall:
 - a. Furnish all necessary materials and labor to assist the designated testing agency in obtaining and handling samples at the project or other sources of materials.

- b. Advise the designated testing agency sufficiently in advance of operations to allow for completion of quality tests and for the assignment of personnel.
- c. Provide and maintain for the sole use of the testing agency adequate facilities for safe storage and proper curing of the test specimens on the project site.

3-13 ACCEPTANCE OF MASONRY CONSTRUCTION:

- A. Completed masonry work which meets all applicable requirements shall be accepted without qualifications.
- B. Completed masonry work which fails to meet one or more requirements must be brought into compliance in an approved manner or may be rejected or accepted as provided in this specification or in the project documents.
- C. The masonry work shall be clean and show a quality of workmanship and finish that conforms to the approved sample when viewed at a distance of 15 ft. in average daylight, or as other acceptable.
- D. Joints shall be tooled and tight showing no separation between mortar and units.
- E. The masonry work shall not show signs of efflorescence.

3-14 CLEANUP:

- A. Holes in joints of masonry surfaces, except weep holes, shall be cut out, filled with mortar, and tooled to match adjacent joints. Repair cracks in masonry.
- B. Before completion of the work, rake out all defects in joints in exposed masonry surfaces, fill with mortar and tool to match existing joints.
- C. After mortar joints have attained their initial set but prior to hardening, completely remove mortar and grout daubs or splashings from exposed masonry surfaces. Dry brush exposed concrete masonry unit surfaces at the end of each days work and after any required pointing. Use stiff-fiber bristled brushes only.
- D. Immediately after grout work is completed remove scum and stains which have percolated through the masonry using a high pressure stream of water. Do not use metal tools or metal brushes for cleaning.
- E. At the conclusion of masonry work, remove from premises scaffolding, equipment, materials, debris, and refuse resulting from the work.

END OF SECTION

SECTION 05500

MISCELLANEOUS METAL

PART 1: GENERAL

1-01 SCOPE:

- A. Work Included: Provide complete, in-place, all miscellaneous metal required to complete the project as indicated on the drawing.
- B. Related Work Included in Other Sections:
 - 1. Miscellaneous supports for mechanical, electrical and plumbing items which are not incorporated into the structure as the work progresses.
 - 2. Steel reinforcement
 - 3. Light Gauge Metal Framing

1-02 QUALITY ASSURANCE:

- A. Comply with pertinent provisions of the following standards:
 - 1. Federal Specifications:

FF-B-561c	Bolts, Lag
FF-B-575c	Bolts, Hexagon and Square
FF-B-588c	Bolt, Toggle; and Expansion Sleeve, Screw
FF-H-111c	Hardware, Builders'; Shelf and Miscellaneous
FF-P-3956	Pin, Drive, Guided; and Pin, Drive, Power Actuated
FF-S-85c	Screws, Cap, Slotted and Hexagon-Head
FF-S-92b	Screws, Machine; Slotted, Cross- recessed or Hexagon Head
FF-S-111d	Screw, Wood
FF-S-325	Shield, Expansion; Nail, Expansion; and & Int. AM-3 Nail, Drive Screw (Devices, Anchoring, Masonry)
FF-W-84a (2)	Washers, Lock, (Spring)
QQ-F-461c (1)	Floor Plate, Steel, Rolled
QQ-S-766c (5)	Steel Plates, Sheets, and Strip Corrosion Resisting

2. American Institute of Steel Construction (AISC): Specification for the Design, Fabrication and Erection of Structural Steel for Buildings. Latest Edition.
3. American National Standards Institute (ANSI):
 - A10.3 Safety Requirements for Powder Actuated Fastening Systems
 - A14.3 Safety Code for Fixed Ladders
 - B27.2 Plain Washers
4. American Society for Testing and Materials (ASTM)(Latest Edition)
 - A36 Structural Steel
 - A53 Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless Steel Pipe
 - A123 Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip.
 - A153 Zinc coated (Hot- dip) on Iron and Steel Hardware
 - A307 Carbon Steel Externally and Internally Threaded Standard Fasteners
 - A653 Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Structural Quality
 - A500 Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - A1011 Steel, sheet and strip, hot-rolled, carbon, structural, high-strength low-alloy and high-strength low-alloy and with improved formability.
 - E488 Tests for Strength of Anchors in Concrete and Masonry Elements
5. California Building Standards Commission (CBSC):
 - California Building Code (CBC), 2010 Edition
6. American Welding Society (AWS):
 - D1.1-2002 Structural Welding Code
7. Title 24, California Code of Regulations

1-03 SUBMITTALS:

- A. General: Comply with pertinent provisions of Section 01300.
- B. Shop Drawings: Shop Drawings, along with catalog cuts, templates, and erection and installation

details, as appropriate, for all miscellaneous metal items listed below shall be submitted. Submittals shall be complete in detail; shall indicate thickness, type, grade, class of metal, and dimensions; and shall show construction details, reinforcement, anchorage, and installation with relation to the building construction.

1. Trash Enclosure Doors
- C. Certificate of Compliance: Manufacturers' certificate of compliance shall be submitted for the following:
1. Carbon Steel
 2. Steel Pipe and Tubing
 3. Floor Plate
 4. Steel Floor Grating
 5. Expansion Bolts
- D. Samples: Samples shall be taken from manufacturer's stock and shall be complete as required for installation in the structure. Samples may be installed in the work, provided each sample is clearly identified and its location recorded. Samples of the following items shall be submitted.
1. Aluminum Finishes
 2. Fasteners
 3. Letters
 4. Thresholds
 5. Safety Nosing
- E. Test Reports: Submit copies of test reports to the Architect.

1-04 QUALIFICATIONS OF INSTALLERS:

- A. Qualification of Welders: Welding to or on structural steel or miscellaneous items of structural steel shall be performed by certified welders qualified in accordance with AWS D1.1 using procedures, materials, and equipment of the type required for the work.
- B. Qualifications of Personnel: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1-05 MISCELLANEOUS ITEMS:

- A. Miscellaneous metal items and their components are not necessarily individually described. Furnish and install miscellaneous items not mentioned or described in accordance with the intent of the drawings and specifications.

1-06 FIELD MEASUREMENTS AND TEMPLATES:

- A. Secure field measurements required for proper and adequate fabrication and installation of the work. Furnish templates for exact location of items to be embedded in concrete and masonry and any setting instructions required for all installation.

PART 2: PRODUCTS

3990 MISCELLANEOUS METAL

05500-3

2-01 MATERIALS:

- A. General: All materials shall be new and the best of their respective kinds, of standard sizes, and shapes as indicated and/or detailed for the work intended.
- B. Steel: Comply with the following standards
 - 1. Shapes, Plates and Bars: ASTM A36
 - 2. Sheets: ASTM A570, Grade 33.
 - 3. Pipe: ASTM A53, Type E or S, Grade B.
 - 4. Tubing: ASTM A500, Grade A.
 - 5. Floor Plate: Fed. Spec. QQ-F-461, Class I, pattern to be selected by Architect.
 - 6. Cold-Finished Bars: ASTM A108
 - 7. Galvanized Sheets: A653, Grade A.
- C. Fasteners:
 - 1. General: Provide corrosion fasteners for exterior use and where built into exterior walls.
 - 2. Standards: All fasteners shall comply with:
 - a. Bolts and Nuts: Regular hexagon head type, ASTM A307, Grade A.
 - b. Lag Bolts: Square head type, Fed. Spec. FF-B-561.
 - c. Toggle Bolts: Tumble wing type, Fed. Spec. FF-B-588.
 - d. Machine screws: Cadmium plated steel, Fed. Spec. FF-S-92.
 - e. Wood screws: Flat-head carbon steel, Fed. Spec. FF-S-111.
 - f. Washers: Circular washers shall be flat and smooth and conform to ANSI B27.2, Type A. Beveled washers for American Standard beams and channels shall be square or rectangular, shall taper in thickness and shall be smooth. Lock washers shall conform to FF-W-84. Flat washers shall be suitable for use intended.
 - g. Powder Driven fasteners shall conform to FF-P-395 or GGG- D-777 and shall be used only when permitted by ANSI A10.3. All safety provisions of ANSI 10.3 shall be followed.
 - h. Expansion Bolts: Fed. Spec. FF-S-325. Expansion bolts shall develop the following minimum allowable pull-out and shear values when tested in accordance ASTM E488 in 2000 psi concrete and based a factor of four and a maximum allowable lateral or withdrawal movement of 0.065 inch:

Diameter (inches)	Shear (pounds)	Pull-out (pounds)	Min-Embedment (inches)
1/4	500	800	2
3/8	745	1100	2-1/2
1/2	2000	2000	3-1/2
5/8	2750	2300	4
3/4	2940	3700	4-3/4
1	3980	5800	6

- D. Non-Shrink Grout: Ready to use metallic aggregate product requiring only the addition of water at the jobsite. The product shall be capable of producing a grout bed material having no drying shrinkage or settlement at any age. The compressive strength of 2" cubes shall be not less than 5000 psi at age 7 days and 7500 psi at age 28 days.
- E. Concrete Inserts: Threaded or wedge type, galvanized ferrous castings, either malleable iron ASTM A47 or cast steel ASTM A27. Provide bolts, washers, and shims as required, hot-dip galvanized, ASTM A153.
- F. Automatic End Welded Studs: Automatic end welded studs shall be Nelson Granular Flux-Filled Anchor Studs. Studs shall conform to Section 4, Part F of AWS D1.1.
- G. Paint:
1. Metal primer paint:
 - a. Use Chrome Oxide Metal Primer, similar or equivalent to Number 15 as manufactured by Sinclair Paint.
 - b. Primer selected shall be compatible with finish coats of paint. Coordinate selection of metal primer to be compatible with actual finish paint.
 2. Galvanizing Repair Paint: Use a high zinc dust content paint for regalvanizing welds in galvanized steel, complying with Fed. Spec. O-G-93 and QQM-151.

2-02 DELIVERY AND STORAGE OF MATERIALS:

- A. Deliver materials in time to insure uninterrupted progress of the work. Store materials to preclude damage and permit ready access for inspection and identification of each shipment. Store materials above ground. Keep material free from dirt, grease, and other foreign matter, and protect from corrosion.

2-03 FABRICATION:

- A. Workmanship:
1. Use materials of size and thickness shown or, if not shown, of required size and thickness to produce strength and durability in the finished product.
 2. Work to dimension shown or accepted on the Shop Drawings, using proven details of fabrication and support. Verify all dimensions at job site.

3. Use type of materials shown or specified for the various components of the Work.
 4. Form exposed work true to line and level, with accurate angles and surfaces and with straight sharp edges.
 5. Ease the exposed edges to a radius of approximately 1/32 inch unless otherwise shown.
 6. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
 7. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush; match and blend with adjoining surfaces.
 8. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, use Phillips flat-head (countersunk) screws or bolts.
 9. Provide for anchorage of the type shown. Coordinate with supporting structure. Fabricate and space the anchoring devices to provide adequate support for intended use.
 10. Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive finish hardware and similar items.
- B. Galvanizing: Provide a zinc coating after fabrication for those items shown or specified to be galvanized, as follows:
1. ASTM A153 for galvanizing iron and steel hardware.
 2. ASTM A123 for galvanizing rolled, pressed, and forged steel shapes, plates, bars, and strip 3 mm (1/8") thick and heavier.
 3. ASTM A386 for galvanizing assembled steel products.
- C. Automatic End Welded Studs: Studs shall be automatically end welded in accordance with the manufacturer's recommendations in such a manner as to provide complete fusion between the end of the stud and the plate. There should be no porosity or evidence of lack of fusion between the welded end of the stud and the plate. Welding shall be done only by qualified welders approved by the welding inspector.
- D. Shop Painting:
1. Shop paint miscellaneous metal work, except members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise specified.
 2. Remove scale, rust, and other deleterious materials before applying shop coat.
 3. Clean off heavy rust and loose mill scale in accordance with SSPC-AP-2 or SSPC-SP-3.
 4. Remove oil, grease, and similar contaminants in accordance with SSPC-SP-1.

5. Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's recommendations, and at a rate to provide the recommended dry film thickness.
6. Use painting methods which will result in full coverage of joints, corners, edges, and exposed surfaces.
7. Apply one shop coat to fabricated metal items; except, apply two shop coats to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first coat.
8. Galvanized surfaces shall be thoroughly cleaned of foreign matter. Mineral spirits or other approved degreasing substances shall be used to remove grease or oil. An etching solution shall be applied to surfaces to be painted to alter the smooth surface and condition the metal with a tooth for proper paint adhesion. Rinsing after etching is not required. Specified primer shall then be applied to the prepared surface by either brush or spray.

2-04 MISCELLANEOUS METAL FABRICATIONS:

A. Railings:

1. Fabricate with materials and dimensions shown on the drawings.
2. Posts, rail and corners shall be joined by mitered and welded joints made by fitting post to top rail, and intermediate rail to post, mitering corners, groove welding joints, and grinding smooth.
3. Railing splices shall be butted and reinforced by a tight fitting interior sleeve not less than 6 inches long.

PART 3: EXECUTION

3-01 INSPECTION:

- A. Examine the areas and conditions under which miscellaneous metal items are to be installed, and correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3-02 INSTALLATION:

A. Setting Loose Plates:

1. Clean concrete bearing surfaces free from bond-reducing materials, and roughen to improve bond to surfaces. Clean the bottom surface of bearing plates.
2. Set loose leveling and bearing plates on wedges, or other adjustable devices.
3. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims; but if protruding, cut off flush with the edge of the bearing plate before packing with grout.
4. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

- B. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction including threaded fasteners for concrete inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.
- C. Cutting, Fitting, and Placement:
 - 1. Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications.
 - 2. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims; but if protruding, cut off flush with the edge of the bearing plate before packing with grout.
 - 3. Provide temporary bracing or anchors in formwork for items which are to be built into concrete or similar construction.
 - 4. Fit exposed connections accurately together to form tight hairline joints.
 - 5. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations.
 - 6. Grind exposed joints smooth, and touch up shop paint coat. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.
- D. Field welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of weld made, and methods in correcting welding work.
- E. Touch-up painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply by brush or spray to provide minimum dry film thickness of 0.051 mm (2.0 mils).

3-03 PROTECTION AND CLEANING:

- A. Remove all soil and foreign matter from finished surfaces and apply such protective measures as may be required to prevent damage or discoloration of any kind until acceptance of project.
- B. Protection shall be provided by strippable coating, protective sleeves, polyethylene sheets, boarding, or any other suitable means during fabrications, shipment, site storage, and erection to prevent damage to the finished work due to stains, discolorations, scratches, or any other cause. Damaged elements shall be replaced as damages occur.
- C. After installation, and after danger of subsequent damage has passed, remove all protective coverings from all exposed surfaces, and clean those surfaces of all soil and discoloration, ready for acceptance.

3-04 FIELD QUALITY CONTROL:

- A. Concrete Expansion Bolts:
 - 1. Fifty (50) percent of the expansion bolts shall be tested to twice the allowable capacity in tension.

2. If any expansion bolt fails, then all expansion bolts shall be tested.
 3. The load test shall be performed in the presence of the testing agency.
 4. The load may be applied by any method that will effectively measure the tension on the bolt, such as direct pull with a hydraulic jack, a torque wrench calibrated using the specific anchor, calibrated spring-loading devices, etc. Anchors in which the torque is used to expand the bolt without applying tension to the bolt may not be verified with the torque wrench.
- B. Automatic End Welded Studs: Test in accordance with AWS D1.1.

END OF SECTION

SECTION 05810
EXPANSION JOINT COVER ASSEMBLIES

PART 1: GENERAL

1-01 SUMMARY:

- A. Included:
 - 1. Seismic expansion joint cover assemblies
- B. Related Sections:
 - 1. Section 07600 – Flashing and Sheet Metal
- C. Related Documents:
 - 1. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1-02 SUBMITTALS:

- A. General: Submit the following according to Conditions of the contract and Division 1 Specification Sections.
- B. Product data: For each type of expansion joint cover assembly specified, including manufacturer's product specifications, installation instructions, details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- C. Shop Drawings: Show fabrication and installation of expansion joint cover assembly including plans, elevations, sections, details of components, joints, splices, and attachments to other units of Work.

1-03 QUALITY ASSURANCE:

- A. Single-Source Responsibility: obtain expansion joint cover assemblies specified in this Section from one source from a single manufacturer. Coordinate compatibility with expansion joint cover assemblies specified in other sections.

PART 2: PRODUCTS

2-01 MANUFACTURERS:

- A. Design is based upon MM Systems (Custom Color) 4520 Elmdale Drive, Tucker, Georgia or equivalent. However reference to that manufacturer shall be construed only as establishing the quality and shapes applicable to the work and shall not be construed limiting competition.
- B. Products: Products used shall be those upon which design is based or equivalent products reviewed by the Architect in advance of incorporating into the work.

- B. Aluminum Finishes: Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
 - 1. Class II, Clear-Anodized Finish: AA-M12C22A31 (Mechanical Finish: As fabricated, nonspecular, Chemical Finish: etched, medium matte; Anodic Coating: Class II Architectural, clear film thicker than 0.4 mil).

PART 3: EXECUTION

3-01 PREPARATION:

- A. Manufacturer's Instructions: In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for phases of Work, including preparing substrate, applying materials, and protecting installed units.
- B. Coordinate and furnish anchorages, setting drawings, templates, and instructions for installation of expansion joint cover assemblies to be embedded in or anchored to concrete or to have recesses formed into edges of concrete slab for later placement and grouting-in of frames.
- C. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary to secure expansion joint cover assemblies to in-place construction, including threaded fasteners with drilled-in expansion shields for masonry and concrete where anchoring members are not embedded in concrete. Provide fasteners of metal, type, and size to suit type of construction indicated and provide for secure attachment of expansion joint cover assemblies.

3-02 INSTALLATION:

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required to install expansion joint covers. Install joint cover assemblies in true alignment and proper relationship to expansion joints and adjoining finished surfaces measured from established lines and levels. Allow adequate free movement for thermal expansion and contraction of metal to avoid buckling. Locate wall and floor covers in continuous contact with adjacent surfaces. Securely attach in place with required accessories. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches on center.
- B. Continuity: Maintain continuity of expansion joint cover assemblies with a minimum number of end joints and align metal members mechanically using splice joints. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of frames. Adhere flexible filler materials to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- C. Extruded Preformed Seals: Install seals complying with manufacturer's instructions and with minimum number of end joints. For straight sections provide preformed seals in continual lengths. Vulcanize or heat-weld field splice joints in preformed seal material to provide watertight joints using procedures recommended by manufacturer. Apply adhesive, epoxy, or lubricant-adhesive approved by manufacturer to both frame interfaces before installing preformed seal. Seal transitions according to manufacturer. Apply adhesive, epoxy, or lubricant-adhesive approved by manufacturer to both frame interfaces before installing preformed seal. Seal transitions according to manufacturer's instructions.

3-03 CLEANING AND PROTECTION:

- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's instructions.

END OF SECTION

SECTION 06101

ROUGH CARPENTRY

PART 1: GENERAL

1-01 DESCRIPTION:

- A. Included: Provide all rough carpentry including all wood, nails, bolts, screws, framing, anchors and other rough hardware, and all other items needed for rough carpentry in this work, but not specifically described in other sections of these specifications.
- B. Related Work Described Elsewhere:
 - 1. Concrete formwork
 - 2. Architectural woodwork
 - 3. Miscellaneous Metal

1-02 QUALITY ASSURANCE:

- A. Codes and Standards: Comply with all pertinent provisions of the latest edition of the following codes and standards:
 - 1. Federal Specifications (Fed. Spec.)
 - FF-B-561C Bolts, (Screw), Lag
 - FF-B-588C(1) Bolt, Toggle: and Expansion Sleeve, Screw
 - FF-N-105B(3) Nails, Brads, Staples, Spikes, Wire, Cut Int Amd 4 and Wrought
 - FF-P-395B Pin, Drive, Guided; and Pin, Drive Powder Actuated
 - QQ-Z-32C Zinc Coated, Electro Deposited, Requirements for
 - 2. U.S. Department of Commerce Product Standards:
 - PS 1-95 Construction and Industrial Plywood
 - PS 20-05 American Softwood Lumber Standard
 - 3. American Society for Testing and Materials (ASTM) Publications:
 - A153-03 Specification for Zinc Coating on Iron and Steel Hardware.
 - A307-04 Carbon Steel Externally and Internally Threaded Standard Fasteners
 - F1667-03 Standards for Driven Fasteners; Nails, Spikes and Stakes.

4. American Wood Preservers' Association (AWPA) Publication:
 - M4-02 Standard for the Care of Preservative Treated Wood Products.
 - L11-04 Use Category System: User Specification for Treated Wood, except Section 6, Commodity Specification
5. American Forest and Paper Association (AF&PA) Publications:
 - 2005 Edition National Design Specification for Wood Construction and Supplement, Design Values for Wood Construction.
 - 2005 Edition ASD/LRFD Manual for Engineered Wood Construction
6. American National Standards Institute (ANSI)
 - ANSI/ASME B18.2.1-1999 Square and Hex Bolts and Screws (Inch Series)
 - ANSI/ASME B18.6.1-1997 Wood Screws (Inch Series)
7. California Building Standards Commission (CBSC):
 - California Building Code, (CBC), 2010 Edition.
 - California Building Code Standards, (CBC STD), 2010 Edition.
8. West Coast Lumber Inspection Bureau (WCLIB) Publication:
 - Standard Grading Rules for West Coast Lumber, No. 17, 2004 Edition.
9. Western Wood Products Association (WWPA) Publication:
 - Western Lumber Grading Rules 2005

B. Conflicting Requirements: In the event of conflict between pertinent codes and regulations and the requirements of the referenced standards or these specifications, the provisions of the more stringent shall govern.

C. Qualifications of Personnel:

1. Throughout progress of the work of this section, provide at least one person thoroughly familiar with the specification requirements, completely trained and experienced in the necessary skills, and who shall be present at the site and shall direct all work performed under this section.
2. In actual installation of the work of this section, use adequate numbers of skilled workmen to ensure installation in accordance with the approved design and approved recommendations of the manufacturer of the material which is being installed or applied.

1-03 SUBMITTALS:

- A. General: Make submittals in accordance with requirements of Section 01340.
- B. Pneumatically-Driven Fasteners: Submit manufacturer's literature and installation instructions and one sample for review by the Architect.
- C. Framing Devices: Submit manufacturer's literature describing dimensions, materials and load carrying capacities for review by the Architect.
- D. Powder Actuated Fasteners: Submit manufacturer's literature describing installation instructions and load carrying capacity for review by the Architect.

1-04 PRODUCT HANDLING:

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation, and to protect the work and materials of all other trades and to protect the materials from environmental conditions. Cover exposed plywood with plastic sheeting during rain or snow.
- B. Replacement: In the event of damage, immediately make all repairs and replacements necessary and at no additional cost to the Owner.

PART 2: PRODUCTS

2-01 GRADING AND MARKING:

- A. Framing Lumber: Grade and grade-mark each piece of lumber in accordance with the following standards:
 - 1. Douglas Fir-Larch: WCLIB or WWP
 - 2. Exceptions: The provisions of WCLIB paragraph 2b and WWP Section 5.6 which permits five percent (5%) of the material to fall below grade shall not apply to structural framing members. Structural framing members which have permissible grade characteristics or defects in such combination as to affect the serviceability of the member shall be rejected.
- B. Plywood: Legibly identified with appropriate grade trademark of American Plywood Association. Plywood shall conform to requirements of Product Standard PS 1. The outer plies of sanded or finished plywood shall be not less than 95 percent of the thickness required at the time of lay-up prior to sanding. Do not incorporate improperly or illegibly identified plywood into the work.
- C. Preservative Treated Lumber and Plywood: Each piece of preservative treated lumber or plywood shall be labeled with a permanent mark indicating conformance with the applicable AWP standard. The label shall be a quality mark of an approved independent inspection agency that maintains continuing control, testing, and inspection over the quality of the product.

2-02 MATERIALS:

- A. Lumber:
 - 1. Dressing: Surface four sides, except when otherwise required.

2. Sizes: Sizes of surfacing of lumber shall conform to PS 20 for dressed sizes of yard and structural lumber. Sizes of framing lumber and board lumber indicated on the drawings and specified hereinafter are given by nominal sizes, unless otherwise specified or indicated. Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced.
3. Moisture Content: To facilitate approximate equilibrium with average local atmospheric moisture conditions, lumber shall have been air seasoned for not less than 30 days, however, moisture content shall not exceed 19% when incorporated into the work. Material shall be kiln-dried when specifically noted or when customary practice requires such procedure.
4. Heart Center: Regardless of specific grading rules, all lumber shall be free of heart center as defined by Section 714.00 of WWPA or WCLIB, except the following members may contain heart center:
 - a. Members bolted to steel or concrete at spacing not to exceed 48"oc.
 - b. Studs less than 10'-0" in height with plywood sheathing on one side.
 - c. Members less than 4'-0" length.
5. Grade: Except as otherwise noted on the drawings, dimension lumber and boards shall be graded as specified in the following subparagraphs. The following designation of materials, i.e. "JOISTS AND PLANKS", "POSTS AND TIMBERS", etc., is not intended to limit the use to such elements of the structure.
 - a. Light Framing:
 - (1) General Use: Douglas Fir-Larch: (2" to 4" thick, 2" to 4" wide), "NO. 1" - LIGHT FRAMING, Paragraph 122b WCLIB or Section 62.11 WWPA.
 - b. Joists and Planks:
 - (1) General Use: Douglas Fir-Larch: (2" to 4" thick, 5" and wider), "NO. 1" STRUCTURAL JOISTS AND PLANKS, Paragraph 123b, WCLIB or Section 62.11 WWPA.
 - (2) Exposed Members: Douglas Fir-Larch (2" to 4" thick by 5" and wider), "SELECT STRUCTURAL" - JOISTS AND PLANKS, Paragraph 123a, WCLIB or Section 62.10 WWPA.
 - c. Beams and Stringers:
 - (1) General Use: Douglas Fir-Larch (5" and thicker), "NO.1" BEAMS AND STRINGERS, Paragraph 130b, WCLIB or Section 70.11 WWPA.
 - (2) Exposed Members: Douglas Fir-Larch (5" and thicker) "SELECT STRUCTURAL" BEAMS AND STRINGERS, Paragraph 130a, WCLIB or Section 70.10 WWPA.
 - d. Boards: (Nominal sizes up to 1-1/2" thick, 2" and wider), "CONSTRUCTION" -

BOARDS, 188b, WCLIB.

- e. Sill Plates bearing on concrete: Douglas Fir-Larch: No. 2 minimum grade, pressure treated,. Use No. 1 Grade if 2"x5" or larger.

B. Plywood:

- 1. Provide plywood in accordance with following listed uses, unless otherwise designated on drawings.
- 2. Material shall bear the appropriate symbol marking as hereinafter specified, however panel thickness, identification index or specie group shall be as required on the drawings.

TYPICAL

APPLICATIONS

Symbol

- | | | |
|----|----------------|-------------------------------------|
| a. | Non-structural | A-C EXT- |
| b. | Roof Sheathing | C-D INT-w/EXT GLUE,
STRUCTURAL I |

C. Rough Hardware:

- 1. Fasteners: Nails, spikes, screws, lag screws, nuts, bolts and similar fastenings of the types and sizes required by the drawings or as otherwise indicated, sufficient to properly draw and secure members in place. Fastenings exposed to weather, and at other conditions which subject the fastenings to corrosion, shall be copper, stainless steel, hot-dip galvanized or other non-corrosive metal as indicated on the drawings or required by the specifications. In the absence of specific requirements elsewhere, the fastenings shall be hot- dip galvanized at such locations. Fastenings, not indicated or specified, shall conform to the requirements of "National Design Specification for Stress Grade Lumber and its Fastenings", of the National Forest Products Association.
 - a. Common Nails and Spikes: Flat head, diamond point, smooth, bright, Fed. Spec. FF-N-105B.
 - b. Mechanically deformed (Annular): Threaded or ring shank, Stronghold, Independent Nail and Packing Co.
 - c. Concrete Nails: Flat countersunk head, diamond point, quench hardened steel.
 - d. Finishing Nails: Brad head, diamond point, smooth or mechanically deformed, Fed. Spec. FF-N-105B.
 - e. Wood Screws: ANSI/ASME B18.6.1
 - f. Bolts and Nuts: Steel machine bolts and nuts, ASTM A-307.
 - g. Lag Screws: ANSI/ASME B18.2.1. Reduced body screws shall not be used.
 - h. Toggle Bolts: Fed. Spec. FF-B-588.

2. Pneumatically Driven Fasteners: Pneumatically driven staples, nails, T-nails or allied fasteners shall be used only when reviewed by the Architect. Submit samples and manufacturer's installation instructions.
3. Framing Devices: Framing anchors, joist hangers and similar devices, Simpson Company, San Leandro, California or equivalent.
4. Powder Actuated Fasteners: The fasteners shall have a dome shaped head, a .145 inch minimum diameter smooth shank and shall have sufficient length to penetrate the concrete 1-1/8 inches. Fasteners shall be installed with a 7/8 inch minimum diameter, 14 gage steel disc under the fastener head. Fasteners shall be manufactured from AISI 1062 or 1065 steel tempered to a minimum core hardness of 50 to 57 Rockwell hardness and shall possess the following minimum properties:

Tensile Strength = 270,000 psi

Shear Strength = 162,000 psi

The fasteners shall be zinc plated with a minimum thickness of .003 inches then zinc chromate passivated. Hilti Power Driven Fasteners – ICC-ES ESR-1663, ESR-1752 and ESR-2269 or Simpson PDP Series Fasteners – ICC-ES ER-4546.

D. Adhesive:

1. General: ASTM D2559.

E. Mortar Bedding for Sill Plates:

1. Dry-Pack Mortar: One part Portland cement to 2 parts fine sand.
2. Non-Shrink Mortar: Ready to use non-metallic aggregate product requiring only the addition of water at the job site. Product shall have the following characteristics:
 - a. Be capable of producing a mortar bed material having no drying shrinkage or settlement at any age.
 - b. Compressive strength of mortar (2" cubes) shall be not less than 5,000 psi at age seven days and 7,500 psi at age 28 days.

F. Bridging: Use one of the following:

1. Two crossed wood pieces, 2" x 3" minimum size.
2. Full depth 2" thick solid blocking.
3. Approved metal cross bridging.

G. Other Materials. All other materials not specifically described, but required for complete and proper performance of the work as indicated on the drawings shall be new, suitable for intended use, and subject to review of the Architect.

2-03 RE-USE OF MATERIALS:

- A. Wood products previously used on this project for forming or other temporary uses may be incorporated into the work as concealed blocking, backing, or similar miscellaneous uses when the material has been cleaned, is equivalent in all respects to new material and has been reviewed by the Architect.

2-04 PRESERVATIVE TREATMENT:

- A. Pressure Treatment: Wood framing and plywood shall be pressure treated with a preservative when used under the following conditions:
 - 1. Foundation plates or sills and sleepers on a concrete slab which is in direct contact with earth.
 - 2. Sills which rest on concrete or masonry foundations.
 - 3. Wood in direct contact with earth.
 - 4. Posts or columns placed directly on concrete or masonry.
 - 5. Wood or plywood located closer than 6" to the earth.
 - 6. Wood nailers embedded in concrete or masonry.
- B. Preservatives:
 - 1. Treatment shall conform to AWPA C-2 for lumber and AWPA C-9 for plywood
- C. Field Handling:
 - 1. Handle treated lumber and treat penetration damage including drilled holes and sawcuts in accordance with AWPA M-4.
 - 2. When treating lumber or plywood with a water borne salt, dry to a moisture content of 19% or less after treatment.

PART 3: EXECUTION

3-01 INSPECTION:

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3-02 WORKMANSHIP:

- A. General: Carpentry work shall produce joints true, plumb, level, tight and well nailed, or fastened as indicated, with all members assembled in accordance with the drawings and with all pertinent codes and regulations.

3-03 FRAMING:

- A. General:
1. In addition to all framing operations customary to fabrication and erection indicated on the drawings, install all backing required for work of other trades.
 2. Do not shim sills, joists, short studs, trimmers, headers, lintels, or other framing components.
 3. Set all horizontal or sloped members with crown up.
 4. Do not splice individual framing members between supports.
- B. Bearings:
1. Make all bearing full unless otherwise indicated on the Drawings.
 2. Finish all bearing surfaces on which structural members are to rest so as to provide positive and even support. Where framing members slope, cut or notch as required to provide uniform bearing surface.
 3. Provide solid blocking for joists and rafters at all bearings.
- C. Notching and Boring:
1. Do not notch, bore, or cut members for pipes, ducts, conduits or other reasons except as shown on the Drawings or as specifically reviewed in advance by the Architect.
- D. Blocking:
1. Install all blocking required to support all items of finish and to cut-off all concealed draft openings, both vertical and horizontal.
 2. Fire-blocking, shall be two inches (nominal) in thickness by the full width of the opening being blocked, or other material conforming to CBC.
 3. Fire-block in the following specific locations:
 - a. In all stud walls at ceiling and floor levels.
 - b. In all stud walls, including stud spaces, so that the maximum dimension of each concealed space is not more than eight feet.
 - c. Between stair stringers at the top and bottom and between studs along and in line with run of stair adjoining stud walls and partitions.
 - d. Around top, bottom, sides and ends of sliding door pockets.
 - e. All other location where openings could afford passage for rodents or flames.
- E. Bridging:
1. Required Locations:

- a. In roof rafter and ceiling joist spans where the depth of the member is more than 8" deep and the spacing is 32" or less.
 - b. In floor joist spans where the member is more than 4" deep.
2. Spacing: The spacing between adjacent bridging members and between the bearing and a bridging member shall not exceed 8'-0". Place bridging at midspan where only one set of bridging is required.
 3. Installation: The lower ends of the cross bridging shall be driven up and nailed after the floor, subfloor, or roof has been nailed.
- F. Sill Plates: Sill plates bearing on concrete or masonry shall be accurately aligned and leveled to the required elevation. Sill plates shall be completely bedded in 1/2 inch portland cement mortar, except for non-bearing walls on true and level floors, so as to obtain a continuous level bearing. Plates shall be secured with anchor bolts in accordance with the structural details. Washers shall be placed between the plate and the nut. Nuts shall be tightened after the bedding has hardened and shall be re-tightened immediately prior to becoming inaccessible.
- G. Stud Walls and Partitions:
1. Studs: Make all studs single length, unspliced.
 2. Corners and Intersections: Unless otherwise indicated on the Drawings, frame all corners and intersections with three or more studs and all required bearing for wall finish.
 3. Spacing: Unless otherwise noted, studs shall be spaced 16" o.c.

3-04 INSTALLATION OF PLYWOOD SHEATHING:

- A. General:
1. Protect all plywood from moisture by use of waterproof coverings until the plywood has in turn been covered so as to be protected.
 2. Install in accordance with the requirements of the drawings and notations thereon.
 3. Allow 1/16 inch spacing at panel ends and 1/8 inch spacing at panel edges.
 4. Install plywood joints to be centered on its supporting members.
 5. Use "short" nails for nailing plywood. Provide nails that penetrate at least 1.5" for 8d nails, but no more than 1.75". Provide nails that penetrate at least 1.625" for 10d nails, but no more than 2.00".
 6. Plywood nails installed incorrectly due to overdriving or misalignment on framing members shall be removed.
- B. Roof Sheathing:
1. Install with face grain perpendicular to supports and continuous over two or more spans with

end joints staggered.

2. No panel less than 24 inches wide shall be used.

3-05 FASTENING:

A. Nailing:

1. Use only common wire nails or spikes of the size required by the NAILING SCHEDULE on the Drawings.
2. Nails used in pressure treated wood shall be hot-dipped, zinc-coated galvanized nails.
3. The use of machine nailing for plywood is subject to a satisfactory jobsite demonstration review by the Architect.
4. Nails in plywood shall not be overdriven to the extent that nailheads penetrate the face ply more than the thickness of the nail head.
5. The spacing center to center of nails shall not be less than the required penetration. Edge or end distances shall not be less than one-half the required penetration. The required penetration is 11 nail diameters for Douglas-Fir lumber.
6. Do all nailing without splitting the wood. Prebore to a diameter smaller than the nail when required to avoid splitting. Replace all split members.
7. Prebored holes will be required for all nails 20d and larger.

- #### B. Bolting:
- Drill holes 1/16 inches larger in diameter than the bolts being used. Drill straight and true from one side only. Bolts shall be provided with plate washers or malleable iron washers. All nuts shall be turned up and made tight at the time of installation and again immediately before being enclosed with other fixed materials or at the completion of the job. Edges of square washers used at exposed locations shall be installed level and plumb.

C. Lag-Screws:

1. The threaded portion of the lag screw shall be inserted into its lead hole by turning with a wrench.
2. Soap or other lubricant shall be used on the screw or in the lead hole to facilitate insertion and prevent damage to the screw.
3. The lead hole for the shank shall have the same diameter as the shank, and the same depth as the unthreaded shank.
4. The lead hole for the threaded portion shall have a diameter equal to 60 to 75 percent (use larger figure for larger bolts) of the shank diameter and a length equal to at least the length of the threaded portion.
5. Washers shall be provided under the heads of lag screws that bear on wood.

D. Wood Screws:

1. The screw shall be inserted in the lead hole by turning with a screwdriver or other tool, not by driving with a hammer.
 2. The lead hole shall have a diameter of about 70 percent of the root diameter of the screw.
- E. Powder-Actuated Fasteners: When used for the attachment of non-bearing, non-shear wall plates to concrete, the fasteners shall not be installed closer than 3 inches from the edge of the concrete nor shall they be spaced closer than 4 inches. Do not use to install plates to the top of concrete curbs nor where a cold joint is made between the slab and foundation below. Install in accordance with low velocity powder actuated tools in accordance with manufacturer's recommendation

3-06 CLEANING UP:

- A. Keep the premises in a neat, safe and orderly condition at all times during execution of this portion of the work, free from accumulation of sawdust, cut-ends, and debris.
- B. Do not allow any wood debris in fill or backfill at any area within the site limits.

END OF SECTION

SECTION 06190

PREFABRICATED WOOD "I" JOISTS

PART 1: GENERAL

1-01 DESCRIPTION:

- A. Work Included: Provide all Prefabricated Wood "I" joists complete, in place, as indicated on the Drawings, specified herein, and as required for a complete and proper installation. The joists shall be "I" shaped joists shop-fabricated with Performance Plus webs and laminated veneer lumber flanges. The web shall have glued vertical joints. The web-flange joint shall be made by inserting the web into a groove in the center of the wide face of the flange member, and gluing the joint.
- B. Related Work Described Elsewhere:
 - 1. Rough Carpentry

1-02 QUALITY ASSURANCE:

- A. Codes and Standards: Comply with applicable provisions of the latest edition of the following codes and standards:
 - 1. U.S. Department of Commerce Standards:
 - PS 1-95 Construction and Industrial Plywood
 - 2. American Society for Testing and Materials (ASTM):
 - D2559 Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions.
 - 3. International Conference of Building Officials (ICBO):
 - California Building Code, 2010 Edition (CBC)
 - 4. Title 24, Part 2, California Building Code, 2010 Edition.
- B. Qualifications of Manufacturer: The joists shall be manufactured by the Truss-Joist Corporation, or equivalent. Alternative joist products will be considered for approval provided, as a minimum, the allowable bending moment, the allowable shear strength, the moment of inertia, modulus of elasticity, and the manufacturing tolerances of the alternative product equals or exceeds that of the specified product. The dimensions and alternative details shall be compatible with the other components of the total structural system.

1-03 SUBMITTALS:

- A. General: Comply with the provisions of Section 01300.
- B. Shop Drawings: Submit shop drawings of all material proposed to be furnished and installed under

this Section. The shop drawings shall include:

1. Plan layout of members
 2. Details of members and their connections.
 3. Installation instructions
 4. Structural properties of alternative components.
- C. Test Reports: Submit reports of tests hereinafter required to the Architect and the Division of the State Architect.

1-04 PRODUCT HANDLING:

- A. Delivery and Storage: The members shall be handled with care so they are not damaged. If stored prior to erection, they shall be stored above ground in a vertical position and protected from the weather.
- B. Protection: Use all means necessary to protect the materials of this Section before, during and after installation, and to protect the materials of all other trades.
- C. Replacement: In the event of damage, immediately make all repairs and replacements necessary to the satisfaction of the Architect and at no additional cost to the Owner.

PART 2: PRODUCTS

2-01 MATERIALS:

- A. Flange members, web members and adhesives shall conform to the provisions of ICC-ES evaluation report, ESR-1153.
- B. Web:
1. Performance Plus as noted in table 1 of ESR-1153.

2-02 FABRICATION:

- A. TJI® joists shall be manufactured by Weyerhaeuser or equivalent and as listed in the reports referred to above and under the supervision of an approved third-party inspection agency.
- B. Tolerances:
- a. Depth: $\pm 1/16$ ".
 - b. Flange Width: $\pm 1/16$ ".
- C. Each of the joists shall be identified by a stamp indicating the joist series, ICC-ES evaluation report number, manufacturer's name, plant number and the independent inspection agency's logo.

PART 3: EXECUTION

3-01 INSTALLATION:

- A. The joists shall be installed to the lines and elevations shown on the drawings.
- B. Temporary construction loads which will cause member stresses beyond design limits are not permitted.
- C. Erection bracing in addition to the specified bridging shall be provided to keep the joists straight and plumb and to assure adequate lateral support for the individual members and the entire system; until the sheathing material has been applied.
- D. Hammering on the inside of flanges (away from web) will not be permitted.
- E. TJI® joists, if stored prior to installation, shall be stored in a vertical position and protected from the weather. They shall be handled with care so they are not damaged.
- F. The contractor shall give notification to the Trus Joist representative – prior to enclosing the TJI® joists – to provide and opportunity for review of the installation.

3-02 CUTTING AND NOTCHING:

- A. No cutting or notching of the flanges will be permitted.
- B. Holes shall not be cut in the web unless such holes are specifically detailed and dimensioned on the Drawings.

3-03 FASTENERS:

- A. Nails or screws installed into the side of flanges shall not be used to support pipe or other loads.

3-04 QUALITY CONTROL:

- A. General:
 - 1. The member fabrication is to be continuously inspected by a fabrication inspector especially approved for that purpose by the Architect and the Division of the State Architect.
 - 2. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered nor shall it obligate the Architect for final acceptance.
- B. Testing and Inspection Services: The following testing and inspection services shall be performed by the fabrication inspector:
 - 1. Products shall be proven by testing and evaluation in accordance with the provisions of ASTM D-5055.
 - 2. Marking: Each member shall be stamped with an identifying mark of the fabrication inspector.
 - 3. Verified Report:
 - a. The fabrication inspector shall make a verified report identifying the members by mark and including pertinent data such as certification of flange material and

species, type of glue and other information as may be required.

- b. The fabrication inspector's verified report shall show, of own personal knowledge, the work covered by the report has been performed and materials used in every member in accordance with, and in conformity to, the Office of the State Architect's approved plans and specifications.
 - c. The verified report shall be mailed to the Architect and the Division of the State Architect upon completion of fabrication.
- C. Joists shall be produced in a plant with quality control inspections by an independent compliance assurance/inspection agency approved by the Architect.
- 1. Alternates and/or Equals:
 - a. Base Bid: Due to the customized detailing and engineering characteristics of the roof and/or floor framing assembly, it is a requirement that TJI® joists be used in the base bid.
 - b. Alternate Manufacturers: Other manufacturers' bids are to be listed in the alternate section of your proposal. All framing plans, detailing and calculations for framing plans, detailing and calculations for the alternate bids will be reviewed by the owner, architect and engineer for structural performance, possible conflicts with related trades, and compatibility with the overall building requirements and building code.
 - c. Alternate Products: Alternate products will only be permitted if written approval and acceptance is obtained by both architect and owner at least seven (7) days prior to the bid date.
 - d. Acceptable Alternates: At the discretion of the specifier of record, accepted alternates will be listed on the final addendum prior to the bid date.

END OF SECTION

SECTION 06200
FINISH CARPENTRY

PART 1: GENERAL

1.01 SUMMARY:

- A. Included: Provide all finish carpentry as required for a complete and proper installation including but not necessarily limited to:
 - 1. Installation of Finish Hardware
 - 2. Specialty Items
- B. Related Work Described Elsewhere:
 - 1. Section 08710 – Finish Hardware
 - 2. Division 10 – Specialty Items
 - 3. Division 11 - Equipment
- C. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specifications, apply to this Section.

1.02 QUALITY ASSURANCE:

- A. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Codes and Standards: Comply with all pertinent provisions of the following codes and standards:
 - 1. Federal Specifications (Fed. Spec.)

FF-B-561C	Bolts, (Screw), Lag
FF-B-588C(1)	Bolt, Toggle; and Expansion Sleeve, Screw
FF-N-1058(3)Int Amd 4	Nails, Brads, Staples, Wire, Cut and Wrought
FF-P-395B	Pin, Drive Powder Actuated
FF-H-111c	Hardware, Builders' Shelf and Miscellaneous
FF-S-111d	Screw, Wood
B27.2-65	Plain Washers

MMM-a-130b

Contact Adhesive

2. American National Standards Institute (ANSI):
 - A10.3-72 Safety Requirements for Powder Actuated Fastening Systems
 3. International Code Council (ICC) Publication:
California Building Code, 2010 Edition
 4. MM-W.1 Manual of Millwork, Woodwork Institute (latest edition)
- C. Conflicting Requirements: In the event of conflict between pertinent codes and regulations and the requirements of the referenced standards or these specifications, the provisions of the more stringent shall govern.

1.03 PRODUCT HANDLING:

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation, and to protect the work and materials of all other trades.
- B. Replacement: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

PART 2: PRODUCTS

2.01 FASTENERS:

- A. Provide fasteners properly selected for the material to be fastened and the substrate to which the material will be fixed, designed to develop proper and adequate strength commensurate with the use.
- B. Common Nails: Flat head, diamond point, smooth, bright, Fed. Spec. FF-N-1058(3).
- C. Finishing Nails: Brad head, diamond point, smooth or mechanically deformed, Fed. Spec. FF-N-108(3).
- D. Wood Screws: Fed. Spec. FF-S-111D.
- E. Lag Screws: Fed. Spec. FF-B-561C.
- F. Toggle Bolts: Fed. Spec. FF-B-588.
- G. Plain Washers: B27.2-65

2.02 ADHESIVE: Contact adhesive, Fed. Spec. MMM-A-130B.

PART 3: EXECUTION

3.01 INSPECTION:

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 WORKMANSHIP:

- A. Finish carpentry work shall be installed level, plumb, true, with joints tightly fit and properly nailed, casework securely fastened as indicated, components assembled in accordance with the pertinent codes and regulations.

3.03 INSTALLATION OF OTHER FINISH HARDWARE:

- A. Locations: Using only the specified hardware, and the proper equipment for the purpose, install all other finish hardware in the following locations throughout the work.
 1. Armor plates: On the push side of single-acting doors & on both sides of double-acting doors.
 2. Combination push-and-pull plates: Centered 40" above the finish floor.
 3. Door pulls on plates: Centered 40" above the finish floor.
 4. Door pulls, sectional: Centered 40" above the finish floor.
 5. Door-closing devices: Install and adjust in strict accordance with the templates and printed instructions supplied by the manufacturer of the devices. Insofar as practicable, doors opening to or from halls or corridors shall have the closer mounted on the room side of the door.
 6. Extension lever flush to bolts: In the edge of the door. Center bolt fronts 12" from the bottom and 12" from top edge of the door.
 7. Flush cup pulls: Centered 40" above the finish floor.
 8. Key cabinet: Install where directed.
 9. Kick plates: On single-acting doors: With kick plate on push side. On double-acting doors: with kick plate on both sides.
 10. Mortise Deadlock Strike: Center between 30" to 44" above the finish floor.
 11. Lever Lock and Lever Latch Strikes: Center between 30" to 44" above the finish floor.
 12. Panic bolt cross bars: Align in horizontal position with top and bottom bolts and rods aligned vertically. Install the centerline of strike 42" above the finish floor.
 13. Push bars: Centered 42" above the finish floor.
 14. Push Plates: Centered 40" above the finish floor.
 15. Other hardware items, not described above: Installed as directed.

- B. Anchoring: Anchor all components firmly into position for long life under hard use. Use only the anchoring devices furnished with the hardware item, unless otherwise specifically directed.
- C. Adjustment: Adjust all operating hardware to operate properly in accordance with manufacturer's published recommendations.
- D. Door Hardware:
 - 1. Mounting height of latching hardware shall be between 30" to 44" A.F.F. per CBC Section 1133B.2.5.2.
 - 2. Pressure to operate the door shall not exceed: 5 lbs (22.2 N) for exterior doors, 5 lbs (22.2 N) for interior doors and when fire doors are required 5 lbs (22.2 N) max or the maximum effort to operate the door may be increased to the maximum allowable by the appropriate administrative authority, not to exceed 15 lbs (66.72 N). 1133B.2.5.
 - 3. Door closer when provided, then the sweep period of the closer shall be adjusted to so that from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3" from the latch, measured to the leading edge of the door. 1133B.2.5.1.
 - 4. All hardware shall meet the requirements of CBC Section 1133B.2.1, 1133B.2.5.1 and 1008.1.8.
 - 5. Thresholds shall comply with CBC Section 1133B.2.4.1.
 - 6. Floor stops shall not be located in the path of travel and 4" maximum from walls. Policy 99-08.
- E. Exit Devices:
 - 1. Panic hardware shall comply with CBC Standard 10-4 (consider that if the device is mounted lower than 36" A.F.F. the clear opening may be restricted to less than the 32" clear opening required). Panic hardware shall be mounted between 36" to 44" above finished floor surface. The unlatching force shall not exceed 15 lbs (66.72 N) applied in the direction of travel. Panic hardware shall comply with CBC Section 1008.1.9.

3.04 WOOD TRIM:

- A. Install wood trim plumb, level and true. Scribe members accurately in place, maintaining full widths of members whenever possible.
- B. Apply trim in full lengths except when single lengths would be impracticable or impossible.
- C. Bevel abutting joints. Miter exterior angles; cope interior angles.
- D. Set all nails for putty.

3.05 SPECIALTY ITEMS:

- A. Install specialty items where the specified item does not include installation within the section in which the item is specified.

- B. Install in accordance with architectural details except when such details are modified by reviewed shop drawings or installation details. In the absence of such details, install in accordance with manufacturer's recommendations as submitted to and reviewed by the Architect.

3.06 CLEANING UP:

- A. Keep the premises in a neat, safe and orderly condition, free from accumulation of sawdust, cut-ends, and debris at all times during execution of this portion of the work.
- B. Do not allow any wood debris in fill or backfill at any area within the site limits.

END OF SECTION

SECTION 07190

UNDER-SLAB VAPOR RETARDER

PART 1: GENERAL

1-01 DESCRIPTION:

- A. Included: Under-slab vapor retarder, seam tape and pipe boots and as shown and/or noted.
- B. Related Work Included Elsewhere:
 - 1. Cast-In-Place Concrete

1-02 QUALITY ASSURANCE:

- A. References:
 - 1. American Society for Testing and Materials (ASTM)
 - a. ASTM E1745 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
 - b. ASTM E154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.
 - c. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
 - d. ASTM E1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 - e. ASTM F1249-01 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
 - 2. American Concrete Institute (ACI)
 - a. ACI 302.1R-96 Vapor Barrier Component (plastic membrane) is not less 10 mils thick.
- B. Qualifications of Manufacturer: Products used in the work of this section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

1-03 SUBMITTALS:

- A. General: Comply with the provisions of Section 01300.
- B. Manufacturers' Data:
 - 1. Complete materials list of all items proposed to be furnished and installed under this Section.
 - 2. Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.

1-04 PRODUCT HANDLING:

- A. Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary and at no additional cost to the Owner.
- C. Delivery: Deliver all materials to the job site in their original unopened containers or packaging with all labels intact and legible.

PART 2: PRODUCTS

2-01 MANUFACTURER:

- A. W.R. Meadows, Inc., PO Box 338, Hampshire, Illinois 60140-0338 or equivalent.

2-02 MATERIALS:

- A. Plastic Vapor Retarder
 - 1. Performance Based Specification: Vapor Retarder membrane must meet or exceed all requirements of ASTM E1745 Classes A, B, & C.
 - a. Maximum Permeance ASTM E96: 0.018 Perms.
 - b. Water Vapor Transmission Rate ASTM F1249 calibrated to ASTM E96 (water method): 0.007 grains/ft²/hr.
 - c. Resistance to Organisms and Substrates in Contact with Soil ASTM E154, Section 13: 0.027 Perms.
 - d. Tensile Strength ASTM E154, Section 9: 84 LBS. Force/Inch.
 - e. Puncture Resistance ASTM D1709, Method B: 4,335 Grams.
 - f. Water Vapor Retarder ASTM E1745: Meets or exceeds Class A, B & C.
 - g. Thickness of Retarder (plastic) ACI 302.1R-96: Not less than 15 mils.
 - 2. Perminator™ 15 mil by W.R. Meadows, or equivalent.

2-03 ACCESSORIES:

- A. Seam Tape
 - 1. High Density Polyethylene Tape with pressure sensitive adhesive. Minimum width 4 inches.
- B. Pipe Boots
 - 1. Construct pipe boots from vapor barrier material and pressure sensitive tape per manufacturer's instructions.
- C. Sand: Clean sand conforming to ASTM C-33.

- D. Other Materials: Materials not specifically indicated but necessary for proper performance of the work shall be as selected by Contractor, subject to review by the Architect.

PART 3: EXECUTION

3-01 EXAMINATION:

- A. Examine surfaces to receive membrane. Notify Contractor if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3-02 SURFACE PREPARATION:

- A. Prepare surfaces in accordance with manufacturer's instructions.

3-03 APPLICATION:

- A. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643-98.
- B. Unroll vapor barrier with the longest dimension parallel with the direction of the pour.
- C. Lap vapor barrier over footings and seal to foundation walls.
- D. Overlap joints 6 inches and seal with manufacturer's tape.
- E. Seal all penetrations (including pipes) with manufacturer's pipe boot.
- F. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
- G. Repair damaged areas by cutting patches of vapor barrier; overlapping damaged area 6 inches and taping all four sides with tape.
- H. Sand: After inspection of membrane, apply a 2-inch uniform layer of sand over membrane. Dampen sand with water immediately prior to placement of concrete.

END OF SECTION

SECTION 07210

BUILDING INSULATION

PART 1: GENERAL

1-01 DESCRIPTION:

- A. Included: Provide building insulation and accessory materials as otherwise required by the Drawings and specified herein.
- B. Related Work in Other Sections:
 - 1. Insulation of mechanical ducts, piping and similar items.

1-02 QUALITY ASSURANCE:

- A. Qualifications of Manufacturer: Products used in the work of this section shall be produced by manufacturers regularly engaged in manufacture of insulation and with a history of successful production acceptable to the Architect.
- B. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

1-03 SUBMITTALS:

- A. Product Data: Within 30 calendar days after award of Contract, submit:
 - 1. Complete materials list of all items proposed to be furnished and installed under this section.
 - 2. Manufacturer's specifications and other data required to demonstrate compliance with specific requirements.
 - 3. Manufacturer's recommended methods of application.

1-04 PRODUCT HANDLING:

- A. Delivery and Storage:
 - 1. Deliver all packaged materials to the job site in their original unopened containers with all labels intact and legible at time of inspection.
 - 2. Store all materials in an approved manner, protecting from exposure to the elements.
- B. Protection: Use all means necessary to protect the materials of this section before, during, and after installation and to protect the work and materials of all other trades.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2: PRODUCTS

2-01 MATERIALS:

- A. Insulation Exterior Walls: Mineral wool batts or blankets, ASTM C665, Type II, Class C, thermal resistance R-19 in exterior walls, and as indicated on drawings. Surface burning characteristics N/R.
- B. Insulation bottom of roof sheathing; CertaPro thermal FSK-25 faced mineral wool batts, ASTM C665, Type III, Class A, category.
 - 1. Surface burning characteristics, flame spread 25, smoke developed 50, ASTM E84. CertainTeed Corporation or equivalent.
- C. Sound Insulation: 3-1/2" thick, unfaced, 16" net in width, 96" in net length, noise barrier batts. Surface burning characteristics, flame spread 10, smoke developed 10, ASTM E84.
- D. Attaching Device: Staples, nails, wire, woven wire netting, metal straps, stick clips, adhesive and other accessory items as required for proper support of insulation.
- E. Other Materials: All other materials not specifically described but required for a complete and proper installation of the work of this section shall be as selected by Contractor subject to review by the Architect.

PART 3: EXECUTION

3-01 INSPECTION:

- A. Examine the areas and conditions under which work of this section will be installed. Correct conditions detrimental to proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3-02 INSTALLATION:

- A. Except as otherwise specifically directed by Architect, install all building insulation in accordance with approved manufacturer's building insulation application instructions as approved by Architect.

3-03 VERIFICATION:

- A. Upon completion of the installation in each case, visually inspect and verify that all insulation is complete and properly installed.

END OF SECTION

SECTION 07270

FIRESTOPPING

PART 1: GENERAL

1-01 SUMMARY:

- A. Included: Throughout the work, seal all joints where shown on the Drawings and elsewhere as required to provide a positive barrier against passage of fire, air and moisture
- B. Related Work Described Elsewhere:
 - 1. Section 07900 - Sealants and Caulking
 - 2. Section 09250 - Gypsum Wallboard
 - 3. Division 15 sections ducts and piping penetrations.
 - 4. Division 16 sections cable and conduit penetrations

1-02 STANDARDS:

- A. Comply with pertinent provisions of the following standards:
 - 1. American Society for Testing and Materials (ASTM) Publications (latest edition)
 - E84 Surface Burning Characteristics of Building Materials, Standard Test Method for
 - E136 Behavior of Materials in a Vertical Tube Furnace at 750 deg. C, Standard Test Method for
 - E814 Fire Tests of Through-Penetration Fire Stops, Standard Method of
 - 2. Underwriters' Laboratories, Inc. (UL) Publications (latest edition)
 - 1479 Fire Tests of Through-Penetration Firestops
 - 3. California Building Code - Chapter 43 for penetrations thru fire rated assemblies.

1-03 SUBMITTALS:

- A. Manufacturer's Data:
 - 1. A complete materials list showing all items proposed to be furnished and installed under this section.
 - 2. Certificates of Compliance: Manufacturers' certificates of compliance that the materials meet the requirements specified.

3. Manufacturers' Data: Manufacturers' data for the firestopping including firestopping composition, performance characteristics, and installation procedures.
 4. Shop Drawings: Shop drawings showing material installation details including reinforcement, anchorage, and fastenings.
- B. Samples: Accompanying the submittal required in Paragraph 1-03, submit samples of each material proposed to be used.

1-04 QUALITY ASSURANCE:

- A. Qualifications of Manufacturers: Products used in the work of this section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.
- B. Qualifications of Installers:
1. Proper installation of firestopping requires that installers be thoroughly trained and experienced in the necessary skills and thoroughly familiar with the specified requirements.
 2. For installation of firestopping throughout the work, use only personnel who have been specifically trained in such procedures and who are completely familiar with the details shown on the drawings and the installation requirements called for in this section.

1-05 PRODUCT HANDLING:

- A. Delivery and Storage: Deliver all materials of this section to the job site in the original unopened containers with all labels intact and legible at time of use. Store only under conditions recommended by the manufacturers. Do not retain on the job site any material that has exceeded the shelf life recommended by its manufacturer.
- B. Protection: Use all means necessary to protect the materials of this section before, during, and after installation and to protect the work and materials of all other trades.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

PART 2: PRODUCTS

2-01 MATERIAL:

- A. Firestopping material shall be asbestos-free and capable of maintaining an effective barrier against flame and gases in compliance with the following requirements:
1. Flame Spread: 25 or less, ASTM E 84.
 2. Smoke Development: 50 or less, ASTM E 84.
- B. Fire Resistance rating periods shall conform to the following:

1. Assembly: 1 hour. Gypsum wallboard metal stud one hour assembly. Maximum 4" diameter schedule 55 steel pipe. U.L. System 147.

2-02 FIRESTOPPING:

A. General:

1. Except as specifically otherwise directed by the Architect, use only the type of firestopping described in this Article.
2. Penetrations in fire rated assemblies shall be protected per C.B.C. chapter 43. Only approved thru penetration assemblies will be accepted where required by C.B.C.
3. Provide firestopping at penetrations of rated fire assemblies.

B. Sealant: Single-component silicone elastomer. CP-25 3M, Metacaulk 950, or equivalent.

C. Putty: 3M Fire Barrier Moldable Putty +, or equivalent.

D. Wrap Strips: 3M FS-195; Metacaulk Wrap Strip, or equivalent.

E. Insulation: High temperature insulation packing and blankets, Kaowool Fire Master Bulk and Kaowool Fire Master Blanket as manufactured by Thermal Ceramics, Augusta, Georgia, or Fibrex Fire Blankets Ontario Canada, or equivalent.

2-03 PRIMERS:

- A. Use only those primers that are non-staining, have been tested for durability on the surfaces to be sealed, and are specifically recommended for this installation by the manufacturer of the firestopping used.

2-04 BACK-UP MATERIALS:

- A. General: Use only those backup materials which are specifically recommended for this installation by the manufacturer of the firestopping system used, and which are nonabsorbent and nonstaining.

2-05 MASKING TAPE: For masking around joints, provide masking tape specifically recommended by the manufacturer of the firestopping system.

2-06 OTHER MATERIALS: All other materials, not specifically described, but required for complete and proper installation of the firestopping system, shall be first quality of their respective kinds, new, and as selected by the Contractor subject to review by the Architect.

PART 3: EXECUTION

3-01 INSPECTION:

- A. Examine the areas and conditions under which work of this section will be performed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3-02 PREPARATION:

- A. Coordination: Coordinate the work with other trades. Firestopping materials at penetrations of insulated pipes and ducts shall be applied prior to insulation, unless the insulation meets the requirements specified for firestopping.
- B. Surface Preparation: Surfaces to be in contact with firestopping materials shall be free of dirt, grease, oil, loose material, rust, or other substances that may affect proper fitting or the required fire resistance.
- C. Installation: Install firestopping materials in strict accordance with the approved listing and the following requirements.
 - 1. Filling: Firestopping materials shall completely fill the void spaces.

3-03 CLEAN-UP:

- A. Remove damming materials after firestopping materials has cured.
- B. Clean adjacent surfaces of excess sealant using a compatible commercial solvent in accordance with solvent manufacturer's instructions and precautions.
- C. Excess cured foam around the penetration seal shall be removed with a sharp knife or blade. Spills of liquid components shall be removed with high-flash mineral spirit solvent, in strict compliance with the manufacturer's recommendation.

END OF SECTION

SECTION 07312
ASPHALT SHINGLES

PART 1: GENERAL

1-01 SUMMARY:

- A. Section Includes:
 - 1. Asphalt Shingles
 - 2. Underlayment
- B. Related Sections:
 - 1. Section 06100 - Rough Carpentry
 - 2. Section 07600 - Sheet Metal
- C. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specifications sections, apply to this Section.

1-02 SUBMITTALS:

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specifications Sections.
- B. Product Data:
 - 1. Asphalt shingles
 - 2. Underlayment
 - 3. Fastening devices
 - 4. Bitumen
 - 5. Sheet metal materials
 - 6. Installation instructions
- C. Shop Drawings:
 - 1. Sheet metal flashing configurations
 - 2. Installation details
- D. Samples: Manufacturer's samples indicating full range of colors and textures of specified shingles.
- E. Quality Assurance Submittals:
 - 1. Manufacturers' Certificate of Compliance indicating the asphaltic fiberglass shingles meet or exceed the following:
 - a. ASTM E108 / UL 790 Class A Fire Resistance
 - b. ASTM D3161 / UL 997 Type I Wind Resistance

2. ASTM 3462

1-03 PROJECT CONDITIONS:

- A. Environmental Requirements: Proceed with installing asphalt shingles only when existing and forecasted weather conditions will permit work to be performed according to manufacturers' recommendations and warranty requirements, and when substrate is completely dry.

1-04 WARRANTY:

- A. General Warranty: The special warranty specified in this article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

- B. Special Warranty: Submit a written warranty signed by manufacturer agreeing to repair or replace asphalt shingles that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, deformation or deterioration of asphalt shingles beyond normal weathering.

1. Warranty Period after date of Substantial Completion and acceptance.

- a. Material manufacturer and contractor issue labor and material warranty for a period of 5 years.

(1) Warranty: 50 years

PART 2: PRODUCTS

2-01 MANUFACTURERS:

- A. Manufacturers: Subject to compliance with requirements provide asphalt shingles produced by one of the following:

1. Certaineed Corp.
2. GS Roofing Products Co.
3. Malarkey Roofing Company

2-02 MATERIALS:

- A. Asphalt Shingles: Colors, blends, and patterns. Where manufacturer's standard products are indicated, provide asphalt shingles with the following requirements:

1. Provide Architect's selections from manufacturer's full range of colors, textures, and pattern for asphalt shingles of type indicated.

- B. SBS Modified Laminated shingles with Polyglass, meeting or exceeding ASTM D 3018 Type 1, ASTM D 3161 Type I modified to 110 mph, ASTM D 3462, ASTM E 108 class A, UL 2218 Class IV Impact Resistant, ICBO. Malarkey roofing company Legacy – 272 or equivalent.

- C. Hip and Ridge Shingles: Manufacturer's standard, factory-precut units to match asphalt shingles.

2-03 ACCESSORIES:

- A. Fiberglass SBS underlayment Malarkey roofing Company #501 UDL or equivalent.
- B. Asphalt Plastic Cement: Nonasbestos fibrated asphalt cement, complying with ASTM D 4586.
- C. Roll-Roofing Lap Cement: Nonasbestos asphalt lap cement, complying with ASTM D 3019, type III.
- D. Nails: Hot-dip galvanized steel, 0.120 inch diameter barbed shank, sharp-pointed, conventional roofing nails with a minimum 3/8 inch diameter head and of sufficient length to penetrate 3/4 inch into solid decking or at least 1/8 inch through plywood sheathing.
 - 1. Where nails are in contact with flashing, prevent galvanic action by providing nails made from the same metal as that of the flashing.

PART 3: EXECUTION

3-01 EXAMINATION:

- A. Examine substrate for compliance with requirements for substrates, installation tolerances and other conditions affecting performance of asphalt shingles. Do not proceed with installation until unsatisfactory conditions have been corrected.

3-02 PREPARATION:

- A. Coordinate installation with flashing and other adjoining work to ensure proper sequencing. Do not install roofing materials until all vent stacks and other penetrations through roof sheathing have been installed and are securely fastened against movement.
- B. Coordinate installation with flashing and other adjoining work to ensure proper sequencing. Do not install roofing materials until all vent stack and other penetrations through roof sheathing have been installed and are securely fastened against movement.

3-03 INSTALLATION:

- A. General: Comply with manufacturer's instructions and recommendations but not less than those recommended by RAMA's "Residential Asphalt Roofing Manual" or "The NRCA Steep Roofing Manual".
 - 1. Fasten asphalt shingles to roof sheathing with nails.
- B. Underlayment: Apply one layer of SBS underlayment horizontally over entire surface to receive asphalt shingles. Installation of underlayment, end laps, top laps and overhang at edge metal shall be in accordance with manufacture and NRCA requirements.
- C. Flashing: Install metal flashing and trim as indicated and according to details and recommendations of the "Asphalt Roofing" section of "The NRCA Steep Roofing Manual" and ARMA's "Residential Asphalt Roofing Manual".
- D. Install asphalt shingles, beginning at roof's lower edge, with a starter strip of roll roofing or inverted asphalt shingles with tabs removed. Fasten asphalt shingles in the desired weather exposure pattern; use number of fasteners per shingle as recommended by manufacturer. Use vertical and horizontal

chalk lines to ensure straight coursing.

1. Cut and fit asphalt shingles at valleys, ridges, and edges to provide maximum weather protection. Provide same weather exposure at ridges as specified for roof. Lap asphalt shingles at ridges to shed water away from direction of prevailing wind.
2. Use fasteners at ridges of sufficient length to penetrate sheathing as specified.

3-04 ADJUSTING:

- A. Replace any damaged materials installed under this Section with new materials that meet specified requirements.

END OF SECTION

SECTION 07600

SHEET METAL

PART 1: GENERAL

1-01 DESCRIPTION:

- A. Included: Provide all sheet metal work shop primed, including, but not limited to the following:
 - 1. Gutters and downspouts
 - 2. Miscellaneous sheet metal accessories
 - 3. Cleaning, pre-treating, and shop priming of all sheet metal work
 - 4. Screening of all openings, including louvers not otherwise screened, to prevent the intrusion of pests.
 - 5. Louvers

- B. Related Work in Other sections:
 - 1. Section 07312- Asphalt Shingles
 - 2. Section 07900- Sealants and Caulking
 - 3. Section 09900- Painting
 - 4. Division 15 Sections for plumbing, mechanical flashings, ductwork, and louvers and vents
 - 5. Division 16 Sections for electrical flashings

1-02 QUALITY ASSURANCE:

- A. Standard: Architectural Sheet Metal Manual, herein referred to as SMACNA MANUAL, Sheet Metal and Air Conditioning Contractors National Association, Inc., 4201 Lafayette Center Drive, Chantilly, VA 20151-1209

- B. Qualifications of Manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.

- C. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section.

1-03 SUBMITTALS:

- A. Manufacturers' Data: Within 30 calendar days after award of the Contract, submit:
 - 1. Complete materials list of all items proposed to be furnished and installed under this section.
 - 2. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.
 - 3. Shop Drawings showing layout, profiles, methods of joining, and anchorage details, including counterflashings, gutters, downspouts, scuppers and expansion joint systems

1. Layout at ¼ inch scale
2. Details at 3 inch scale

4. Manufacturers specifications and other data describing the priming and pretreatment coats for priming of materials furnished under this Section.

5. Manufacturers recommended installation procedures.

1-04 PRODUCT HANDLING:

- A. Protection: Use all means necessary to protect materials of this section before, during, and after installation and to protect installed work and materials of all other trades.

- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1-05 PROJECT CONDITIONS

- A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Insure the best possible weather resistance and durability of work and protection of finishes.

PART 2: PRODUCTS

2-01 DESIGN:

- A. Standard commercial items may be used for flashing, trim and reglets, provided all such items meet or exceed the quality standards specified herein.

2-02 MATERIALS AND GAGES:

- A. Where sheet metal is required, but material and gage is not indicated on drawings, provide the highest quality and gage commensurate with the referenced standards.

2-03 GALVANIZED IRON:

- A. General: Sheet metal or iron shall be a standard brand of open- hearth copper-bearing steel, copper-molybdenum iron, or pure iron sheets.

- B. Zinc coating:
 1. All galvanized sheets shall have a zinc coating applied by hot-dip process to all surfaces.
 2. Zinc coating shall weigh not less than 1-1/4 oz. per sq. ft. nor more than 1-1/2 oz per sq. ft. of surfaces covered and shall conform with ASTM A 653.

2-04 NAILS, RIVETS, AND FASTENERS:

- A. Use only soft iron rivets having rust-resistive coating, galvanized nails, and cadmium plated screws and washers in connection with galvanized iron and steel.

2-05 FLUX:

- A. All flux used for galvanized iron or steel shall be raw muriatic acid.

2-06 SOLDER:

- A. All solder used on galvanized sheet steel shall conform to ASTM B 32.

2-07 PRIMER:

- A. Metal primer shall be compatible with system to be applied over primer. Use pre-treatment coating on galvanized surfaces, except when galvanized primer as approved by Architect does not require pre-treatment.

2-08 LOUVERS

- A. Louvers: Stationary, frame 18 ga galvanized steel box frame, 4" thick. Blades 20 gauge galvanized blades permanently affixed to frames. Blade spacing 2" – 40 deg. Furnish louvers with still extension Model DBF-04 Series as manufactured by Dowco Corporation, Dallas, Texas or equivalent.

2-09 OTHER MATERIALS:

- A. All other materials, not specifically described but required for a complete and proper installation of the work of this section shall be new, first quality of their respective kinds, and as selected by the Contractor subject to review by the Architect.

2-09 FINISHES

- A. Pre-treat with material recommended by paint manufacture for total system. Coordinate with finish painter.
- B. Prime metal with pain system printer

PART 3: EXECUTION

3-01 INSPECTION:

- A. Examine the areas and conditions under which work of this section will be installed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3-02 COORDINATION:

- A. Coordinate the installation of sheet metal relating to roofing with the work included under the roofing specification section to assure that a properly installed weathertight installation is produced.

3-03 WORKMANSHIP:

- A. General:
 - 1. Form all sheet metal accurately and to the dimensions and shapes required, finishing all molded and broken surfaces with true, sharp, and straight lines and angles and, where

intercepting other members, coping to an accurate fit, soldering securely.

2. Unless otherwise specifically permitted by the Architect, turn all exposed edges back 1/2".
- B. Expansion: Form, fabricate, and install all sheet metal so as to adequately provide for expansion and contraction in the finished work.
- C. Weatherproofing:
1. Finish watertight and weathertight where so required.
 2. Make all lock seam work flat and true to line, sweating full of solder.
 3. Make all lock seams and lap seams, when soldered, at least 1/2" wide.
 4. Where lap seams are not soldered, lap according to pitch but in no case less than 3".
 5. Make all flat and lap seams in direction of flow.
- D. Joints:
1. Join parts with rivets or sheet metal screws where necessary for strength or stiffness.
 2. Provide suitable watertight expansion joints for all runs of more than 40 feet, except where closer spacing is indicated on the Drawings or required for proper installation.
- E. Nailing:
1. Whenever possible, secure metal by means of clips or cleats without nailing through the metal.
 2. In general, space all nails, rivets, and screws not more than 8" apart and, where exposed to the weather, use lead washers.
 3. For nailing into wood, use barbed roofing nails 1-1/4" long by 11 gage.
 4. For nailing into concrete, use drilled plugholes and plugs.

3-04 EMBEDMENT:

- A. Embed all metal in connection with roofs in a solid bed of industrial roofing cement or other materials and methods approved in advance by the Architect.

3-05 SOLDERING:

- A. General:
1. Thoroughly clean and tin all joint materials prior to soldering.
 2. Perform all soldering slowly with a well heated copper in order to heat the seams thoroughly and to completely fill them with solder.

3. Perform all soldering with a heavy soldering copper of blunt design, properly tinned for use.
4. Make all exposed soldering on finished surfaces neat, full flowing and smooth.

B. Cleaning: After soldering, thoroughly wash acid flux with a soda solution.

3-06 TOUCH-UP: Immediately after installation, touch-up all damaged and abraded prime coated areas using the same materials as used for shop priming.

3-07 TESTS:

A. Upon request of the Architect, demonstrate by hose or standing water that all flashing and sheet metal is completely watertight.

END OF SECTION

SECTION 07900

SEALANTS AND CAULKINGS

PART 1: GENERAL

1-01 SUMMARY:

- A. Included: Throughout the Work, caulk and seal all joints as details and required to provide a positive barrier against passage of air and moisture.
- B. Related Sections:
 - 1. Section 07270 Firestopping
 - 2. Section 07600 Sheet Metal
 - 3. Section 08110 Steel Doors and Frames
 - 4. Section 09250 Gypsum Wallboard
- C. Related Documents: Drawings and general provisions of Contract including General and Supplementary conditions and other Division 1 specifications, apply to this Section.

1-02 SUBMITTALS:

- A. General: Submit the following according to the Conditions of the contract and Division 1 Specification Sections.
- B. Product Data:
 - 1. Manufacturers' Product literature for Sealants and Caulking
 - 2. Installation instructions
- C. Samples:
 - 1. Provide four manufacturers standard color charts for initial color selection purposes.
 - 2. Provide three cured two inch samples of colors selected for verification of installed work prior to installation of sealants.

1-03 QUALITY ASSURANCE:

- A. Qualifications of Manufacturers: Products used in the work of this section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect.
- B. Qualifications of Installers:
 - 1. Proper calking and proper installation of sealants require that installers be thoroughly trained and experienced in the necessary skills and thoroughly familiar with the specified

requirements.

3. For caulking and installation of sealants throughout the work, use only personnel who have been specifically trained in such procedures and who are completely familiar with the joint details shown on the drawings and the installation requirements called for in this section.

1-04 DELIVERY, STORAGE AND HANDLING:

- A. Delivery and Storage: Deliver all materials of this section to the job site in the original unopened containers with all labels intact and legible at time of use. Store only under conditions recommended by the manufacturers. Do not retain on the job site any material which has exceeded the shelf life recommended by its manufacturer.
- B. Protection: Use all means necessary to protect the materials of this section before, during, and after installation and to protect the work and materials of all other trades.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

1-05 GUARANTEES: Sealant joints shall be guaranteed against adhesive and cohesive failure of the sealant and against water penetration through the sealed joint for 5 years.

PART 2: PRODUCTS

2-01 SEALANTS AND CAULKING:

- A. Use sealant systems as scheduled in this section and identified on the drawings.
- B. Colors:
 1. Colors for each sealant installation will be selected by the Architect from standard colors normally available from the sealant and caulking manufacturers.
 2. In concealed installations, and in partially or fully exposed installations where so approved by the Architect, standard gray or black sealant may be used.

2-02 PRIMERS:

- A. Use only those primers which are non-staining, have been tested for durability on the surfaces to be sealed, and are specifically recommended for this installation by the manufacturer of the sealant used.

2-03 BACKUP MATERIALS:

- A. General: Use only those backup materials which are specifically recommended for this installation by the manufacturer of the sealant used, and which are nonabsorbent and nonstaining.
- B. Backer Rod: Open or closed cell polyethylene or polyurethane as recommended by sealant manufacturer.

2-04 BOND-PREVENTIVE MATERIALS:

- A. Use only one of the following as best suited for the application and as recommended by the manufacturer of the sealant used.
 - 1. Polyethylene tape, pressure-sensitive adhesive, with the adhesive required only to hold tape to the construction materials as indicated.
 - 2. Aluminum foil conforming to MIL-SPEC-MIL-A-148E.
 - 3. Wax paper conforming to Fed. Spec. UU-P-270.

2-05 MASKING TAPE: For masking around joints, provide masking tape conforming to Fed. Spec. UU-T-106c.

2-06 OTHER MATERIALS: All other materials, not specifically described, but required for complete and proper caulking and installation of sealants, shall be first quality of their respective kinds, new, and as selected by the Contractor subject to the approval of the Architect.

PART 3: EXECUTION

3-01 INSPECTION:

- A. Substrate surface shall be inspected to ensure that no bond-breaker materials contaminate the surface to which the sealant is to adhere and to ensure that unsound substrates are repaired. Installation of sealant shall be evidence of acceptance of the substrate.
- B. Joint dimensions shall be verified prior to installation of the sealant to ensure that all dimensions are within tolerance established in the manufacturer's literature. Unacceptable variations shall be called to the Architect's attention for resolution prior to installing any material.

3-02 PREPARATION:

- A. General: Prepare all joints in accordance with manufacturer's recommended instructions to ensure maximum adhesion. Prime as required, protecting all adjacent exposed surfaces.
- B. Concrete and Ceramic Tile and Similar Surfaces:
 - 1. All surfaces in contact with sealant shall be dry, sound, and well brushed and wiped free from dust.
 - 2. Use materials acceptable to sealant manufacturer and conforming to local V.O.C. requirements, to remove oil and grease, wiping the surfaces with clean rags.
 - 3. Where surfaces have been treated, remove the surface treatment by sandblasting or wire brushing.
 - 4. Remove all laitance and mortar from the joint cavity.
 - 5. Where backstop is required, insert the approved backup material in the joint cavity to the depth required.
- C. Steel Surfaces:

1. Steel surfaces in contact with sealant shall be sandblasted or, if sandblasting would not be practical or would damage adjacent finish, the metal shall be scraped or wire-brushed to remove mill scale.
 2. Use materials acceptable to sealant manufacturer complying with local V.O.C. regulations to remove oil and grease, wiping the surfaces with clean rags.
 3. Remove protective coatings on steel by sandblasting or by materials that leave no residue.
- D. Aluminum Surfaces:
1. Aluminum surfaces in contact with sealant shall be cleaned of temporary protective coatings, dirt, oil, and grease.
 2. When masking tape is used for a protective cover, remove the tape, and tape adhesives remaining on Aluminum, just prior to applying the sealant.
 3. Use only such materials to remove protective coatings as are recommended for that purpose by the manufacturer of the aluminum work, which are nonstaining and comply with local V.O.C. regulations.

3-03 INSTALLATION OF BACKUP MATERIAL:

- A. Use only the backup material recommended by the manufacturer of the sealant and approved by the Architect for the particular installation, compressing the backup material 25% to 50% to secure a positive and secure fit. When using backup of tube or rod stock, avoid lengthwise stretching of the material. Do not twist or braid hose or rod backup stock.

3-04 PRIMING:

- A. Use only the primer recommended by the manufacturer of the sealant and approved by the Architect for the particular installation. Apply the primer in strict accordance with the manufacturer's recommendations as approved by the Architect.

3-05 BOND-BREAKER INSTALLATION:

- A. Install an approved bond-breaker where recommended by the manufacturer of the sealant and where directed by the Architect, adhering strictly to the installation recommendations as approved by the Architect.

3-06 INSTALLATION OF SEALANTS:

- A. General: Prior to start of installation in each joint, verify the joint type and verify that the required proportion of width of joint to depth of joint has been secured.
- B. Equipment: Apply sealant under pressure with hand or power- actuated gun or other appropriate means. Guns shall have nozzle of proper size and shall provide sufficient pressure to completely fill joints as designed.
- C. Masking: Thoroughly and completely mask all joints where the appearance of sealant on adjacent

surfaces would be objectionable.

- D. Installation of Sealant: Install the sealant in strict accordance with the manufacturer's recommendations as approved by the Architect, thoroughly filling all joints to the recommended depth.
- E. Tooling: Tool all joints to the profile shown or as directed by Architect.
- F. Cleaning Up:
 - 1. Remove masking tape immediately after joints have been tooled.
 - 2. Clean adjacent surfaces free from sealant as the installation progresses. Use solvent or cleaning agent as recommended by the sealant manufacturer.

3-07 SCHEDULE OF SEALANTS: (See Appendix #1)

APPENDIX #1 - SCHEDULE

<u>Typical joint types and potential movement requirements</u>	<u>Recommended sealant</u> <i>(See Appendix #2)</i>
A. <u>Extreme Movement Sealants</u> (+100% or -50% movement capability)	
Vertical/horizontal joint, such as expansion joints, precast planks, and prestressed concrete joints.	S-6
B. <u>Significant Movement Sealants</u> (+25% or -25% movement capability)	
1. Vertical or inclined joints such as panel, coping, expansion, precast planks, and prestressed concrete joints, and sloped pavement.	S-1, 3 or 6
2. Horizontal joints exposed to fuel or gas spillage.	S-10
3. Horizontal joints not exposed to fuel or gas spillage.	S-1, 2, 3, 4, 6 or 7
C. <u>Minimal Movement Sealants</u> (+25% or -25% movement capability)	
1. Vertical or inclined joints such as perimeters of doors, windows, wall penetrations.	S-1, 3, 4, or 6
2. Horizontal joints not exposed to fuel or gas spillage.	S-2, or 5
D. <u>Glazing Sealants</u>	
1. Structural Glazing (Requires pre-testing and prior written approval from the sealant manufacturer before specifying.)	S-7, or 8
2. Non-structural	S-7, or 8
E. <u>Interior Sealants and Caulking</u>	
1. General	C-1
2. Special	
a. Bathrooms and kitchens	S-9
b. Exposed acoustical	S-9, or C-2
c. Non-exposed acoustical	S-9, or C-3

APPENDIX #2

S = Sealants

REF #	ASTM SPEC	FED. SPEC	PRODUCT DESCRIPTION & REQUIRED PRODUCT CHARACTERISTICS
S-1	C-920-05 Type M Class 25 Grade NS	A-A-1556A Class A Type II	-Two component, non-sag, polyurethane or polysulfide sealant - Shore A hardness of 20-40 -Joint movement range of +/- 25%
S-2	C-920-05 Type M Class 25 Grade NS	A-A-1556A Class A Type I	-Two component, self leveling, polyurethane or polysulfide sealant - Shore A hardness of 25-40 -Joint movement range of +/- 25%
S-3	C-920-05 Type S Class 25 Grade NS	A-A-1556A Class A Type II	-Low modulus, one component, non-sag, polyurethane or polysulfide sealant -Shore A hardness of 15-25 -Joint movement range of +/- 50% -Minimum elongation of 700%
S-4	C-920-05 Type S Class 25 Grade NS	A-A-1556A Class A Type II	-One component, non-sag, polyurethane or polysulfide sealant -Shore A hardness of 25-40 -Joint movement range of +/- 25%
S-5	C-920-05 Type S Class 25 Grade P	A-A-1556A Class A Type I	-One component, self leveling, polyurethane or polysulfide sealant -Shore A hardness of 15-45 -Joint movement of +/- 25%
S-6	C-920-05 Type S Class 25 Grade NS	TT-S-1543(b) Class A	-Low modulus, one component, non-sag, neutral cure, silicone sealant -Shore A hardness of 15-20 -Joint movement range of +100% to -50% -Joint size may be as little as two times joint movement -Minimum elongation of 1200%
S-7	C-920-05 Type S Class 25 Grade NS	TT-S-1543(b) Class A	-One component, neutral cure, non-sag, silicone sealant -Shore A hardness of 25-30 -Joint movement range of +/- 25%

REF #	ASTM SPEC	FED. SPEC	PRODUCT DESCRIPTION & REQUIRED PRODUCT CHARACTERISTICS
S-8	C-920-05 Type S Class 25 Grade NS	TT-S-1543(b) Class A	-One component, acetoxo cure, non-sag, silicone sealant -Shore A hardness of 25-30
S-9	C-920-05 Type S Class 25 Grade NS	TT-S-1543(b) Class A	-One component, non-sag, mildew resistant silicone sealant -Shore A hardness of 25-30
S-10	C-920-05 Type M/S Class 25 Grade P/NS	SS-S-200E(2) Type H	-One or two component, coal tar extended, fuel resistant polyurethane sealant -Shore A hardness of 15-35
C = Caulking			
C-1	C-834-05	N/A	-One components acrylic latex caulking minimum 75% recovery per ASTM C-736-82 -Maximum joint movement of +/- 7.5%
C-2	N/A	TT-S-1657	-One component, butyl rubber caulking -Maximum joint movement of +/- 5%
C-3	N/A	N/A	-One component, acoustical caulking -Non-drying, non-hardening, synthetic rubber, normally not paintable

END OF SECTION

SECTION 08110

STEEL DOORS AND FRAMES

PART 1: GENERAL

1-01 SUMMARY:

A. Section Includes:

1. Doors: Seamless, composite construction.
2. Frames: Pressed steel frames.
3. Assemblies:
 - a. Labeled and fire rated
 - b. Non-Rated
4. Provide factory primed doors and frames to be field painted.

B. Related Sections:

1. Section 06101 - Rough Carpentry
2. Section 06200 – Finish Carpentry
3. Section 08710 - Finish Hardware
4. Section 09900 - Painting

C. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1-02 REFERENCES:

A. SDI Standards

1. SDI-106 – Recommended Standard Door Type Nomenclature
2. SDI-108 – Recommended Selection and Usage Guide for Standard Steel Doors
3. SDI-111 – Recommended Detail and Guidelines for Standard Steel Doors, Frames and Accessories
4. SDI-117 – Manufacturing Tolerances for Standard Steel Doors and frames
5. SDI-118 – Basic Fire Door Requirements

B. ANSI Standards

1. ANSI/UL 10B – Fire Test of Door Assemblies.
2. ANSI/UL 10C – Positive Pressure Fire Tests of Door Assemblies
3. ANSI/UL 1784 – Air Leakage Test of Door Assemblies
4. ANSI/NFPA 80 – Fire Doors and fire Windows
5. ANSI/NFPA 252 – Fire Tests of Door Assemblies
6. ANSI/SDI A250.3 – Test Procedure and Acceptance Criteria for Factory Applied Finish

- Painted Steel Surfaces for Steel Doors and Frames
- 7. ANSI/SDI – A250.4 – Test Procedure and Acceptance Criteria for Physical endurance for Steel Doors, Frames, Frame Anchors and Hardware Reinforcings
- 8. ANSI/SDI A250.6 – Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames
- 9. ANSI/SDI A250.7 – Nomenclature for Standard Steel Doors and Steel frames
- 10. ANSI/SDI A250.10 – Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames
- 11. ANSI/SDI A250.11 – Recommended Erection Instructions for Steel Frames (formerly SDI-105)
- 12. A115 – Hardware Preparation in Steel Doors and Steel Frames
- 13. A115.IG – Installation Guide for Doors and Hardware

C. ASTM Standards

- 1. ASTM A1008 – Standard Specification for Steel Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High Strength Low-Alloy with Improved Formability.
- 2. ASTM A568 – Standard Specification for Steel Sheet, Carbon and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
- 3. ASTM A1011 – Standard Specification for Steel Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
- 4. ASTM A591 – Standard Specification for Steel Sheet, Electrolytic Zinc Coated, for Light Coating Weight (Mass) Applications
- 5. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hip-Dip Process
- 6. ASTM A924 – Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot Dip Process

1-03 QUALITY ASSURANCE:

- A. Qualifications of Manufacturer: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of steel doors and with a history of successful production acceptable to the Architect.
- B. Qualifications of Installers: Use skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- C. Single Source: All work of this Section shall be produced by a single manufacturer unless otherwise approved by the Architect.
- D. Doors and Frames: Comply with Steel Door Institute "Recommended Specifications; Standard Steel Doors and Frames" (SDI-100) and as herein specified.
- E. Fire Rated Door Assemblies: Where fire-rated door assemblies are indicated or required, provide fire-rated door and frame assemblies that comply with CBC 715.4.3, 715.4.6 and 715.4.6.1 and have been tested, listed, and labeled in accordance with UL10B, UL10C or NFPA 80 and NFPA 252"Fire Tests of Door Assemblies" by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.

1-04 SUBMITTALS:

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specifications Sections.
- B. Product Data: For each type of door and frame specified including:
 - 1. Details of Construction
 - 2. Material Dimensions and gauges
 - 3. Hardware preparation
 - 4. Core
 - 5. Label compliance
 - 6. Sound ratings
 - 7. Finishes
- C. Shop Drawings; Submit for fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.
 - 1. Provide schedule of doors and frames using same reference numbers for details and openings as those on contract drawings.
 - 2. Indicate coordination of glazing frames and stops with glass and glazing requirements.
- D. Label Construction Certification: Door assemblies required to be fire-rated and exceeding sizes of tested assemblies, submit manufacturer's certification that each door and frame assembly has been constructed to conform to design, materials and construction equivalent to requirements for labeled construction.

1-05 PRODUCT HANDLING:

- B. Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.
- C. Delivery and Storage: Deliver all materials to the job site in their original unopened containers or packaging with all labels intact and legible. Store in accordance with the manufacturers recommendations as reviewed by the Architect.

PART 2: PRODUCTS

2-01 ACCEPTABLE MANUFACTURERS:

- A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering steel doors and frames that may be incorporated in the work include; but are not limited to, the following:
 - 1. Amweld/Div. of Amweld International, LLC.
 - 2. Ceco Door/Div. of ASSA Abloy
 - 3. Curries Company

4. Pioneer Industries/Div. of Security Holdings, LLC
5. Steelcraft/Div. IR Security & Safety
6. Republic Doors and Frames/Div. of Windsor Republic Doors

2-02 MATERIAL:

- A. Sheet steel for Frames: Hot rolled primed quality carbon steel, pickled and oiled, complying with ASTM A 1011 and ASTM A 568.
- B. Sheet steel for Doors: Cold-rolled, commercial quality steel with a stretcher level degree of flatness complying with ASTM A 1008 or A 620 and ASTM A 568.
- C. Supports and Anchors: Fabricate of not less than 18 gage galvanized sheet steel.
- D. Inserts, Bolts, and Fasteners: Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls, complying with ASTM A 153, Class C or D as applicable.
- E. Shop Applied Paint:
 1. Primer: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints.

2-03 STEEL DOORS:

- A. Fabrication - General:
 1. Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. NO seam shall occur on the door face; edge seams welded, filled, and ground smooth. A channel shall be provided at the top and bottom of the door, sealed tight and flush for water tightness. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at project site. Comply with SDI-100 requirements as follows:
 - a. Exterior Doors: SDI-100, Level III, extra heavy-duty, Model 2, minimum 16-gauge faces.
 - b. Interior Doors: SDI-100, Level I, standard-duty, Model 2, minimum 20-gauge faces.
 2. Fabricate exposed faces of doors and panels, including stiles and rails of non-flush units, from only cold-rolled steel.
 3. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel (at fabricator's option).
 4. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat Phillips heads for exposed screws and bolts.

2-04 LABELED DOORS AND FRAMES:

- A. Doors, as required by Door Schedule, shall have door and frame construction, and hardware as necessary, to conform to the requirements of the Underwriters' Laboratories, Inc., for the class of door

indicated. Proof of such conformance shall be submitted for review. The label of the Underwriters' Laboratories will be accepted as evidence of conforming to these requirements. The Underwriters' authorized labeled door construction details shall take precedence over indicated or specified details except when Drawings or specifications requires heavier gages than required by Underwriters' Laboratories. Installation of labeled doors and frames, including hardware and operation characteristics, shall be in accordance with CBC 715.4.6 & NFPA 80 "Fire Doors and Fire Windows". Where wall installation conditions are such that a label may not be applied, submit a certificate of label construction.

2-05 PAINTING:

- A. Clean, treat, and paint exposed surfaces of steel door and frame units. Do not paint over label on fire resistive doors and frames.
- B. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.
- C. An approved paste filler, knife applied, shall be used to fill irregularities in exposed surfaces.
- D. Apply shop coat of rust inhibitive metallic oxide or synthetic resin prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint. The first coat shall be baked separately or oven dried in accordance with the manufacturer's standard practice.

2-06 DOOR LOUVERS:

- A. Provide sight-proof stationary louvers for interior doors where indicated, constructed of inverted V-shaped or Y-shaped blades formed of 24-gauge cold-rolled steel set into 20-gauge steel frame.

2-07 FRAMES:

- A. Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, of types and styles as shown on drawings and schedules. Conceal fastenings, unless otherwise indicated. Fabricate frames of minimum 16-gauge cold-rolled steel.
- B. Fabricate frames with mitered and full profile welded joints. Frame members shall be completely welded on face, backbend, soffit, rabbet and stops with all welds ground and finished smooth.
- C. Provisions for Hardware: Frames to be prepared at the factory for the installation of template hardware; all template hardware shall fit the frames without requiring any additional field cutting, fitting, drilling, or tapping. Frames shall be cut, reinforced, drilled, and tapped to templates to receive all hardware specified; frames to receive surface-applied hardware provided with reinforcing plates only. Where concealed overhead door closers are required in frame members, the necessary; additional space, cut-outs, reinforcement, and provisions for fastenings shall be made in heads of frames for the closers. Cover boxes provided in back of all hardware cut-outs. Door frames shall be punched to receive three rubber or vinyl door silencers on lock side of single doors, and one silencer for each leaf in heads of double-door frames. Lock strikes set out to provide clearance for silencers. Provide 26 gauge steel plaster guards or mortar boxes, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.
- D. Anchors on Jambs formed to shapes and sizes shown and as necessary for the adjoining type of wall construction. The design of anchors shall be per manufacturer's standard except as detailed

specifically and formed from metal of the same gauge as the frame. Jamb anchors shall be located near the top and bottom of each jamb and at intermediate points not over 24 inches apart. Floor clips shall be fastened to the bottom of each jamb member for anchoring frame to floor construction. Clips shall be adjustable, or fixed, as detailed, and drilled for 3/8" inch diameter anchors bolts. Where floor fill occurs, the bottom of frames shall terminate at the indicated finished floor levels and be supported by an adjustable extension clip angle resting on, and anchored to, the structural slab. Gauge of anchors and clips shall not be less than recommended by the Steel Door Institute.

PART 3: EXECUTION

3-01 GENERAL:

- A. Install standard steel doors, frames, and accessories in accordance with final shop drawings, manufacturer's data, and as herein specified.

3-02 INSTALLATION OF FRAMES:

- A. Placing Frames: Comply with provisions of ANSI/SDI – A250.11"Recommended Erection Instructions for Steel Frames", unless otherwise indicated.
- B. Place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
- C. Install fire-rated frames in accordance with UL10B, UL10C, NFPA 80 & NFPA 252 and manufacturer's written recommendations.
- D. In stud partitions, provide a minimum of 3 wall anchors per jamb, suitable for the adjoining wall construction, at hinge and strike levels. Frames over 7'-6" shall be provided with an additional anchor per jamb.

3-03 INSTALLATION OF DOORS:

- A. Fit hollow metal doors accurately in frames, within clearances specified in SDI-100.
- B. Place fire-rated doors with clearances as specified in CBC Section 715, UL10B, UL10C, NFPA 80 & NFPA 252 and manufacturers written recommendation.
- C. Hardware applied in accordance with manufacturer's templates and instructions.
- D. Hardware, with exception of prime coated items removed, tagged, boxed, and reinstalled after finish work is completed.

3-04 PRIME COAT TOUCH-UP:

- A. Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

3-05 FINAL ADJUSTMENT: Check and readjust operating finish hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition.

END OF SECTION

SECTION 08710

FINISH HARDWARE

PART 1: GENERAL

1-01 SUMMARY:

- A. Section Includes:
 - 1. Furnishing of Finish Hardware
- B. Related Sections:
 - 1. Section 06200 - Finish Carpentry
 - 2. Section 08110 - Steel Doors and Frames

1-02 DEFINITIONS:

- A. Hardware Groups: Groupings of hardware described in the Hardware Schedule located at the end of this section and identified on the Door Notes located on the Floor Plan drawings.

1-03 SUBMITTALS:

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specifications.
- B. Product Data:
 - 1. Manufacturer's technical product data for each item of hardware.
 - 2. Installation instructions
 - 3. Maintenance of operating parts and finishes.
 - 4. Catalog cuts of each hardware item.
- C. Hardware Schedule: Coordinate with doors, frames, and related work to ensure proper size, thickness, hand, function and finish.
 - 1. Schedule Content: Based on hardware schedule in this Section, furnish schedule organized into hardware types indicating complete designations for every item required for each door opening and items requiring hardware. Include the following information:
 - a. Type, style, function, size and finish of each hardware item.
 - b. Name and manufacturer of each item.
 - c. Fastenings
 - d. Location of each hardware set cross referenced to locations on the Drawings both on floor plans and door schedule.
 - e. Explanation of all abbreviations, symbols, and codes contained in the schedule.
 - f. Mounting location for hardware.
 - g. Door and frame sizes and materials
 - h. Keying information

2. Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.
- D. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
- E. Submit factory prepared templates for doors, frames and other work for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1-04 QUALITY ASSURANCE:

- A. Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer.
- B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
 1. Require supplier to meet with Owner to finalize keying requirements and to obtain final instructions in writing.

1-05 PRODUCT HANDLING:

- A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.
- B. Packaging of door hardware is responsibility of supplier. 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. Two or more identical sets may be packed in same container.
- C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.
- D. Deliver individually packaged door hardware items promptly to place of installation.

1-06 MAINTENANCE:

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2: PRODUCTS

2-01 GENERAL:

3990 FINISH HARDWARE

08710-2

- A. Proprietary Products: references to specific proprietary products are used to establish minimum standards of utility and quality.
- B. Fasteners:
 - 1. Furnish all finish hardware with all necessary screws, bolts, and other fasteners of suitable size and type to anchor the hardware in position for long life under hard use.
 - 2. Furnish fastenings where necessary with expansion shields, toggle bolts, sex bolts, and other anchors acceptable to the Architect, according to the material to which the hardware is to be applied and the recommendations of the hardware manufacturer.
 - 3. All fastenings shall harmonize with the hardware as to material and finish.
- C. Finishes of all hardware shall match the finish of the locksets, unless otherwise noted. Take special care to coordinate all of the various manufactured items furnished under this Section, to ensure acceptable uniform finish.

2-02 KEYING:

- A. Masterkeying: Masterkey all locks and cylinders as directed by the Architect.
- B. Number of keys: Furnish three keys for each lock, twelve master keys for each set, three grand-masterkeys, and three great-grand-masterkeys.
- C. Construction Keying: Furnish a construction masterkey system with keys for locks and cylinders. Use only the construction keys during construction.
- D. Identification and Delivery: Factory stamp permanent keys "DO NOT DUPLICATE". Identify permanent keys with tags and send direct to the Owner by registered mail.
- E. Latching and locking doors that are hand-activated and which are in a path of travel, shall be operable with a single-effort by lever hardware, panic bars, push-pull activating bars, or other hardware designed to provide passage without requiring the ability to grasp the opening hardware. California Building Code (CBC) 1003.3.

PART 3: EXECUTION

3-01 DELIVERIES:

- A. Secure all items sufficiently in advance to ensure their availability and make all necessary deliveries in a timely manner to ensure orderly progress of the total Work.

3-02 INSPECTION AND INSTALLATION:

- A. Upon completion of the installation, and as a condition of its acceptance, visually inspect all finish hardware furnished under this Section and place in optimum working condition.

3-03 KEY CHANGING:

- A. At the time of final acceptance of the Work, the Contractor will remove construction key and key doors to new system as directed by the Owner.

3-04 HARDWARE SCHEDULE:

Manufacturer:

- Ives 1
- Yale 2
- Norton 3
- Trimco 4
- Pemko 5
- PRECISION 6

HARDWARE TYPE 1 (EXTERIOR)

1 ½ pr.	Hinge 5BB1 4 ½ x 4 ½	626	1
1	PANIC HARDWARE 2108x 4908A	626	6
1	Cylinder 2153	626	2
1	Lock Guard 1082-6	629	4
1	Closer 7500 BF	AL	3
1	Silencer 1229 A	626	4
1	Threshold 271 A	AL	5
1	Weatherstripping S88D		5
1	Kickplate K0050 10" LDW	630	4
1	Door Bottom 315 NA	AL	5
1	Door Stop 1254	626	4

HARDWARE TYPE 2 (INTERIOR STOREROOM)

1 ½ pr.	Hinge 5BB1 4 ½ x 4 ½	626	1
1	Lockset AU 5408 LN	626	2
1	Cylinder 2153	626	2
	Silencer 1229 A	626	4

HARDWARE TYPE 3 (RESTROOM)

1 ½ pr.	Hinge 5BB1 4 ½ x 4 ½	626	1
1	Lockset AU 5417 LN	626	2
1	Cylinder 2153	626	2
	Silencer 1229 A	626	4

HARDWARE TYPE 4 (INTERIOR NON-LOCKING)

1 ½ pr.	Hinge 5BB1 4 ½ x 4 ½ NRP	626	1
1	PANIC HARDWARE 2108x 4908A	626	6
1	Closer 7500 BF	AL	3
1	Kickplate K0050 10" LDW	630	4
	Silencer 1229 A	626	4

HARDWARE TYPE 5 (EXTERIOR DOUBLE DOORS)

3 pr.	Hinge 5BB1 4 ½ x 4 ½	626	1
2	Lockset AU 8808 FL	626	2
2	Cylinder 2153	626	2
2	Closer 7500BF	626	2
2	Kickplate K0050 10" LDW	630	4

	Silencer 1229 A	626	4
2	Door Bottom 315-NA	AL	5
2	Door Stop 1263	626	4
	Weatherstripping 588D		
1	Threshold 271 A	AL	5
2	Lock Guard 1082-6	629	4

HARDWARE NOTES:

1. Effort to Operate Doors. Maximum effort to operate doors shall not exceed 5 pounds for exterior door and 5 pounds for interior doors, such pull or push effort being applied at right angles to hinged door and at the center plane of sliding or folding doors. Compensating devices or automatic door operators may be utilized to meet the above standards.
2. Hand activated door opening hardware shall be centered between 30- inches and 44 inches above the floor. Latching and locking doors that are hand activated and which are in a path of travel shall be operable with a single effort by lever type hardware by panic bars, push-pull activating bars, or other hardware designed to provide passage without requiring the ability to grasp the opening hardware. Locked exit doors shall operate as above in egress direction.
3. 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.
4. Exit doors shall be openable from the inside without the use of a key or any special knowledge or effort.
5. Floor mounted door stops shall be mounted within 4" of face of adjacent wall.

END OF SECTION

SECTION 09203
EXTERIOR LATHING

PART 1: GENERAL

1-01 SUMMARY:

A. Included:

1. Lathing for cement plaster over metal stud substrate.

B. Related Sections:

1. Section 06101 – Rough Carpentry
2. Section 07600 – Sheet Metal
3. Section 09220 – Portland Cement Plaster

C. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to this Section.

1-02 REFERENCES:

A. Codes and Referenced Standards:

1. ASTM C847 Standard Specification for Metal Lath
2. ASTM C 1063 Installation of Lathing and Furring for Portland Cement-Based Plaster.
3. California Building Code, 2010 Edition
4. Specifications for Metal Lathing and Furring, published by Metal Lath/Steel Furring Association, current edition, Chicago, Illinois.

1-03 SUBMITTALS:

A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specifications sections and Section 01300.

B. Product Data:

1. Materials listing of all materials proposed to be provided.
2. Data sheet on each product.

C. Samples:

1. 4"x4" section of each lath
2. 4"x4" section of building paper
3. 4" length of each accessory

1-04 QUALITY ASSURANCE:

- A. Qualifications of Workmen: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1-05 PRODUCT HANDLING:

- A. Protection: Use all means necessary to protect the work and materials of this Section before, during, and after installation and to protect the work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary and at no additional cost to the Owner.

PART 2: PRODUCTS

2-01 MANUFACTURERS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include but are not limited to the following:

1. Expanded Metal Lath
 - a. Alabama Metal Industries Corp. (AMICO)
 - b. Dale/Incor
 - c. Gold Bond Building Products Div., National Gypsum Co.
 - d. Unimast, Inc.
 - e. United States Gypsum Co.
2. Accessories:
 - a. Metal:
 - (1) Alabama Metal Industries Corp (AMICO)
 - (2) Dale/Incor
 - (3) Delta Star, Inc., Superior
 - (4) Fry Reglet
 - (5) Gold Bond Building Products Div., National Gypsum Co.
 - (6) Keene Products, Metalex
 - (7) Unimast, Inc.
 - (8) United States Gypsum Co.
 - (9) Western Metal Lath

2-02 MATERIALS:

- A. Metal Lath shall consist of the following types of material.
1. Diamond Mesh: Expanded from copper alloy steel, galvanized 3.4 lbs. per square yard.

2. Diamond Mesh Self Furring: Expanded from copper alloy steel, galvanized 3.4 lbs. per square yard providing a minimum 1/4" space from solid substrate.
 3. 1/8 inch Flat Rib: Lath 1/8" deep, expanded copper alloy steel ribs spaced at 1-1/2" apart running length of the sheet, galvanized 3.4 lbs per square yard.
 4. 3/8 in. High Rib Lath: 3/8" deep expanded copper alloy steel ribs at 4-1/2" apart with 3/16" intermediate ribs running length of sheet galvanized, 3.4 lb. per square yard.
- B. Building Paper: Asphalt saturated felt free from holes and breaks and weighing not less than 14 pounds per 100 square feet, or waterproof paper, complying with Fed. spec. UU-B-790 and Fed. Spec QQ-L-101, Type 1, Grade D.
- C. Paper Backed Lath: Self furring sheet of galvanized welded wire fabric lath, 16 x 16 gauge, not to exceed 2" openings. The waterproof building paper to exceed Fed. Spec. UU-B790a, Type 1, Grade B, equal to Aqua-K-Lath, heavy duty.
- D. Accessories:
1. Grounds, Screeds: Galvanized, minimum 26 gage, size and dimension as required to provide for plaster thickness.
 - a. Ventilation Screed: Superior #115 – 4 1/2" point to point or equivalent.
 2. Corner Reinforcement: Expanded corner bead expanded metal diamond mesh, galvanized min. 2-1/8" flanges.
 3. Strip Reinforcement: Expanded metal diamond mesh, galvanized, 4" minimum width.
 4. Control Joints and Expansion Joints: Fabricated from minimum No. 26 gage galvanized steel sheets, plain, perforated or expanded flange.
 - a. Expansion Screed, 26 gage, 7/8" ground Model 15 by Dale/Incor metal trim.
 - b. Separation Screed, 26 gage, 7/8" ground Model 50 by Dale/Incor metal trim.
 - c. 26 gage inside corner and outside corner joints will be utilized.
 5. Drip Mould: Fabricated from minimum 24 gage galvanized steel sheet. With large perforations.
 - a. Soffit Drip Mould, 24 gage with 2 inch flange.
 - b. Drip Mould (Blind Stop), 24 gage, 7/8" ground.
- E. Fasteners:
1. Wire: US No. 18 gage galvanized annealed steel wire.
 2. Screws: 1-1/4 inch Super-Tite modified trusshead zinc coated or 1-1/4 inch Buildex type S-

12 Pancake head Climaseal coated.

PART 3: EXECUTION

3-01 INSTALLATION:

- A. Building Paper: 2 layers of specified building paper shall be applied over all studs or sheathing of all exterior walls. Apply in weatherboard fashion lapping not less than 3" at horizontal joints and 6" at vertical joints staggering vertical joints.
- B. Metal Reinforcement:
 - 1. General: Comply with ASTM C-1063 Installation of Lathing and Furring for Portland Cement based plaster. Do not continue lath across control or expansion joints.
 - 2. Diamond Mesh:
 - a. Stud Partitions: Apply with long dimension perpendicular to supports. Lap ends not less than 1 inch and sides not less than 1/2 inch. End laps not occurring over supports shall be tied together with 18 gage galvanized annealed wire. Attachments to supports shall be as specified in Table 25-C.
 - 3. Ribbed Lath: Ribbed metal lath shall be applied with ribs against the supports. 1/8" rib lath shall be lapped at sides by nesting outside rib or by lapping 1/2". 3/8" rib lath shall be lapped at sides by nesting outside rib. Each type shall lap at least 1" at ends. Joints occurring between supports shall be laced with No. 18 gage galvanized annealed wire. Attachment to supports shall be as required by Table 25-B and C at the end of this Section.
 - 4. Grounds and Accessories: Grounds shall be provided at the juncture of plaster with other materials, as provided by customary practices of the industry, and as specifically shown on the drawings.

3-02 PERMISSIBLE USAGES:

- A. The types of metal reinforcement used shall be as required by the Drawings. When types are not designated, one or more of the types specified in Paragraph 2-02 may be used, consistent with requirements included in Table 25-B included at the end of this section.

3-03 ATTACHMENT OF METAL LATH:

- A. Attachment for metal lath shall be appropriate for the type of assembly and construction and shall be in compliance with Table 25-C types of lath attachment to wood and metal supports.
- B. Where exterior lath is attached to horizontal wood supports the following attachments shall be used in addition to the methods of attachment set forth in Table 25-C: Secure lath to alternate supports with ties consisting of a double strand of No. 18 W&M gauge 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 the joist and the ends of the wire secured together with three twists of the wire.

3-04 INSTALLATION:

A. Metal Frame Construction:

1. Install furring devices to provide clearance for "plaster-keys" to form. (Not necessary where bearing area of support is less than 1-5/8" wide).
2. Stagger end laps. Return lath 4" around corners or use cornerite. Carry lath over foundation at least 2".

B. Exterior Stud Walls:

1. A weep screed shall be provided at the foundation plate line on all exterior stud walls. The screed shall be of a type which will allow trapped water to drain to the exterior of the building. The weather-resistant barrier and exterior lath shall cover and terminate on the attachment flange of the screed.

3-05 CONTROL JOINTS:

- A. Control joints shall be pairs of casing beads mounted back-to-back or specially designed metal plastering accessories (expansion joints).
- B. Material shall be galvanized steel or zinc alloy.
- C. Install control joints with attachment only to the edges of abutting sheets of lath, so that lath is not continuous or tied across the joint.
- D. Where control joints are placed parallel to framing members, install joints so that none is more than 4" away from a framing member.
- E. Install control joints to create panels no larger than 144 sq. ft. with no dimension exceeding 18 ft. or a length to width ratio of 2-1/2 to 1.
- F. Install control joints at all locations where panel sizes or dimensions change. Joints shall extend the full width or height of the plaster membrane.

END OF SECTION

**TABLE NO. 25-B¹ - TYPES OF LATH
MAXIMUM SPACING OF SUPPORTS**

TYPE OF LATH	MINIMUM WEIGHT (Per Square Yard) GAUGE & MESH SIZE	VERTICAL (in inches)			HORIZONTAL (in inches)	
		Wood	Metal		Wood or Concrete	Metal
			Solid Plaster Partitions	Other		
1. Expanded Metal Lath (Diamond Mesh)	3.4	16 ³	16 ³	16	16	16
2. Flat Rib Expanded Metal Lath	3.4	19	224	19	19	19
3. 3/8" Rib Expanded Metal Lath	3.4	24	24 ⁵	24	24	24
	4.0	24	24 ⁵	24	24	24

1. For fire-resistive construction, see Tables Nos. 7A, 7B and 7C. For shear-resisting elements, see Table No. 25-1
2. Metal lath and wire fabric lath used as reinforcement for portland cement plaster shall be furred out away from vertical supports at least 1/4 inch. Self-furring lath meets furring requirements. Exception: Furring of expanded metal lath is not required on supports having a bearing surface width of 1-5/8 inches or less.
3. Span may be increased to 24 inches with self-furred metal lath over solid sheathing assemblies approved for this use.
4. Wire backing required on open vertical frame construction except under expanded metal lath and paperbacked wire fabric lath.
5. May be used for studless solid partitions.
6. Woven wire or welded wire fabric lath, not to be used as base for gypsum plaster without absorbent paperbacking or sloperforated separator.
7. Span may be increased to 24 inches on vertical screw or approved nailable assemblies.

**TABLE NO. 25-C - TYPES OF LATH
ATTACHMENT TO WOOD AND METAL¹ SUPPORTS**

TYPE OF LATH	TYPE & SIZE	NAILS ²³		SCREWS ³⁶	
		MAXIMUM SPACING ⁵		MAXIMUM SPACING ⁵	
		Vertical	Horizontal	Vertical	Horizontal
		(in inches)		(in inches)	
1. Diamond Mesh Expanded Metal Lath & Flat Rib Metal Lath	4d blued smooth box 1-1/2" No. 14 gauge 7/32" head (clinched) ⁸ 1" No. 11 gauge 7/16" head, barbed 1-1/2" No. 11 gauge 7/16" head, barbed.	6 6 6	-- -- 6	6	6
2. 3/8" Rib Metal Lath and Sheet Lath	1-1/2" No. 11 gauge 7/16" head, barbed	6	6	6	6

1. Metal lath, wire lath, wire fabric lath & metal accessories shall conform with approved standards.
2. For nailable nonload-bearing metal supports, use annular threaded nails or approved staples.
3. For fire-resistive construction, see Tables Nos. 7B and 7-C. For shear-resisting elements, see Table No. 25-I. Approved wire and sheet metal attachment clips may be use.
4. With chisel or divergent points.
5. Maximum spacing of attachments from longitudinal edges shall not exceed 2 inches.
6. Screws shall be an approved type long enough to penetrate into wood framing not less than 5/8 inch and through metal supports adaptable for screw attachment not less than 1/4 inch.
7. When lath and stripping are stapled simultaneously, increase leg length of staple 1/8 inch.
8. For interiors only.
9. Attach self-furring wire fabric lath to supports at furring device.
10. Three attachments per 16-inch-wide lath per bearing. Four attachments per 24-inch-wide lath per bearing. Five attachments per 24-inch-wide lath per bearing.

SECTION 09220

PORTLAND CEMENT PLASTER

PART 1: GENERAL

1-01 SUMMARY:

- A. Included: Portland Cement Plaster three-coat system.
- B. Related Sections:
 - 1. Section 06101 – Rough Carpentry
 - 2. Section 09203 - Exterior Lathing
- C. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specifications, apply to this Section.

1-02 SUBMITTALS:

- A. Product Data:
 - 1. Complete materials list of all items proposed to be furnished and installed.
 - 2. Manufacturers written recommendations, proportion mixes, and installation instructions for factory prepared finish materials.

1-03 SYSTEM DESCRIPTION:

- A. General: The Three-Coat System is an exterior finishing system and is comprised of: Lath, Scratch Coat, Brown Coat, and a Finish Coat.
- B. Application Methods: The Three-Coat System is applied directly to a structure at the construction site.

1-04 QUALITY ASSURANCE:

- A. Codes and Reference Standards: In addition to complying with all pertinent codes and regulations, comply with the materials handling and workmanship provisions of "Reference Specifications" of the California Lathing and Plastering Contractors Association.
- B. Qualifications of Personnel: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified methods requirements and the methods needed for proper performance of the work of this Section.
- C. Allowable Tolerances: Maximum deviation from true plane 1/8 inch in 10 feet as measured by straight edge placed at any location on surface.

1-05 DELIVERY, STORAGE, AND HANDLING:

- D. Deliver manufactured materials in original unopened packages or containers, with manufacturer's

label intact and legible.

- E. Keep cement and lime dry, stored off ground, under cover, and away from damp surfaces.
- F. Remove wet and deteriorated materials from project site.
- G. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to owner.

1-06 JOB CONDITIONS:

A. Environmental Requirements:

- 1. Cold weather requirements: Do not apply plaster unless minimum ambient temperature of 50 °F has been and continues to be maintained for minimum of 48 hours prior to application and until plaster is cured.
- 2. Hot weather requirements: Protect cement plaster from uneven and excessive evaporation during hot, dry weather.

B. Protection:

- 1. Screen openings with plastic film when building is subject to hot, dry winds or temperature differentials of more than 20°F.
- 2. Protect finished surfaces installed prior to plastering by covering with material appropriate for the surface to be protected.
- 3. Maintain protection in place until completion of work.

PART 2: PRODUCTS

2-01 MATERIALS:

A. Cement:

- 1. Portland Cement: ASTM C150, Type I. Use white cement for job-mixed finish coat.
- 2. Plastic Cement: ASTM C150, Type I cement.

B. Special Finishing Hydrated Lime: ASTM C206, Type S.

C. Aggregates:

- 1. ASTM C-897.
- 2. Gradation:
 - a. Base coat:

U.S. STANDARD SIEVE	MAXIMUM %	MINIMUM %
No. 4 (4.75-mm)	0	-----
No. 8 (2.36-mm)	10	0
No. 16 (1.18-mm)	40	10
No. 30 (600-um)	65	30
No. 50 (300-um)	90	70
No. 100 (150-um)	100	95

D. Water: Clear and free from substances harmful to plaster.

E. Admixtures: Harbourite as manufactured by Fibermesh, Inc., 4019 Industry Drive, Chattanooga, TN 37416 or equivalent.

2-02 MIXES:

A. General:

1. Conform to ASTM C-926 Application of Portland Cement Based Plaster.
2. Accurately proportion materials for each plaster batch with measuring devices of known volume.
3. Size batches for complete use within maximum of one hour after mixing.
4. Retemper plaster stiffened from evaporation, but do not use or retemper partially hydrated cement plaster.
5. Do not use frozen, caked, or lumping materials, and remove such materials from job site immediately.
6. Mix factory prepared cement plaster in accordance with manufacturer's written instructions.
7. Use moist, loose, sand in mix proportions.
8. Withhold 10% of mixing water until mixing is almost complete, then add as needed to produce necessary consistency.

B. Mechanical Mixing:

1. Clean mixer of set or hardened materials before loading for new batch.
2. Maintain mixer in continuous operation while adding materials.
3. Conform to mixing sequence, cycle of operations, and time recommended by manufacturer of plaster materials.

- C. Hand Mixing:
 - 1. Do not hand mix unless authorized by architect.
- D. Mix proportions by volume:

TABLE NO. 25-F - PORTLAND CEMENT PLASTER

PORTLAND CEMENT PLASTER						
COAT	VOLUME CEMENT	MAXIMUM WEIGHT (OR VOLUME) LIME PER VOLUME CEMENT	MAXIMUM VOLUME SAND PER VOLUME CEMENT	APPROX. MIN. THICKNESS	MIN. PERIOD MOIST CURING	MINIMUM INTERVAL BETWEEN COATS
First	1	20 lbs	4	3/8"	48 Hours	48 Hours
Second	1	20 lbs	5	1st & 2nd Coats total 3/4"	48 Hours	7 days
Finish	1	1	3	1st, 2nd & Finish Coats 7/8"	-----	-----

- 1. Admixtures: Maximum 1 lb. per 94 lbs. of cementitious materials. (Not required over masonry or concrete surfaces.)

PART 3: EXECUTION

3-01 EXAMINATION:

- A. Verify that surfaces to be plastered are free of dust, loose particles, oil, and other foreign matter which would affect bond of plaster coats.
- B. Examine construction, grounds, and accessories to insure that finished plaster surfaces will be true to line, level, and plumb, without requiring additional thickness of plaster.
- C. Verify that concrete or masonry surfaces are rough or prepared in a manner to provide bond for plaster.

3-02 PREPARATION:

- A. Wet absorptive base with fine fog spray of clean water to produce uniform moist condition.
- B. Apply bonding agent to concrete or masonry surfaces as recommended by manufacturer's instructions. Portland cement dash bond coat may be used.

3-03 APPLICATION:

- A. General:
 - 1. Apply cement plaster either by hand or machine.
 - 2. Interrupt cement plaster only at junctions of plaster planes, at openings, or at control joints.

3. Tool through second and finish coats to produce "V" joint at intersection of frames or other items of metal or wood which act as plaster grounds.
4. Apply second coat to first coat, bringing out to grounds, flat to true surface, and free of imperfections which would reflect in finish coat.
5. Reconsolidate second coat by floating, and roughen to assure bond with finish coat as specified in Section 07243 Synthetic Plaster Finish System.
6. Nominal plaster thicknesses: per Table 25F, Article 2-02D.1.
7. Measure thickness from back plane of metal lath, back plane of metal reinforcement or from face of solid base.

B. Base Coats:

1. Over metal base:
 - a. Apply with sufficient material to form keys through metal lath.
 - b. Embed and fill all spaces of lath and scratch vertical surfaces horizontally.
 - c. Scratch horizontal surfaces in one direction only.
2. Over solid bases:
 - a. Apply first coat with sufficient pressure to insure tight contact with complete coverage of solid bases, immediately scratching to provide mechanical key for second coat.
 - b. Apply second coat with sufficient pressure to insure tight contact with first coat.
 - c. Bring surface to true and even plane.
 - d. Float to uniformly rough surface to provide bond for finish coat.

C. Curing:

1. Maintain moist conditions by fine fog spray.
2. Cure base coats in accordance with Table 25F, Article 2-02D.1.

3-04 FIELD QUALITY CONTROL:

- A. Slump test ASTM C 143, modified slump cone 2 in. x 4 in. x 6 inc.; maximum slump 2 inch.

3-05 ADJUST AND CLEAN:

- A. Patching:
 1. Upon completion point-up plaster around trim and other locations where plaster meets dissimilar materials.

2. Cut out and patch defective or damaged plaster.
3. Match patch of defective or damaged plaster to existing work in form and texture.

B. Cleaning:

1. Remove plaster and protective materials from expansion beads, perimeter beads, and adjacent surfaces.
2. Remove stains from plaster surfaces that would adversely affect finish painting.

3-06 CLEANING AND PROTECTION:

- A. General: In addition to all other protection, protect all adjacent finished surfaces from the accidental application of plaster.
- B. Cleaning Up: Upon completion of the work of this Section promptly inspect all adjacent surfaces and remove all traces of spilled and splashed plaster.

END OF SECTION

SECTION 09250

GYPSUM BOARD

PART 1: GENERAL

1-01 SUMMARY:

A. Section Includes:

1. Gypsum board assemblies attached to wood framing members.

B. Related Sections:

1. Section 06100 – Rough Carpentry
2. Section 07200 – Insulation
3. Section 07900 – Sealants and caulking
4. Section 09900 – Painting
5. Section 16000 – Electrical-Light fixtures

C. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specifications sections, apply to this Section.

1-02 DEFINITIONS:

A. Gypsum Board Construction Terminology: Refer to ASTM C11 and GA 505 for definitions of terms for gypsum board construction

1-03 SUBMITTALS:

A. General: Submit the following according to Conditions of the Contract and Division 1 Specifications.

B. Product Data:

1. Complete materials list of all items proposed to be furnished and installed under this Section.
2. Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.
3. Manufacturers' recommended installation procedures.

C. Samples: 3 each, 2 foot square of each specified gypsum board finish.

1-04 QUALITY ASSURANCE:

A. Single Source Responsibility: Obtain each type of gypsum board and related joint treatment materials from a single manufacturer.

1-05 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials in original packages, containers or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other uses. Neatly stack gypsum boards flat to prevent sagging.
- C. Handle gypsum boards to prevent damage to edges, ends, and surfaces. Do not bend or otherwise damage metal corner beads and trim.

1-06 PROJECT CONDITIONS:

- A. Environmental Conditions, General: Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C 840 and with gypsum board manufacturer's recommendations.
- B. Minimum Room Temperatures: For non-adhesive attachment of gypsum board to framing, maintain not less than 40 deg. F. For adhesive attachment and finishing of gypsum board maintain not less than 50 deg. F for 48 hours prior to application and continuously thereafter until drying is complete.
- C. Ventilate building spaces to remove water not required for drying joint treatment materials. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

PART 2: PRODUCTS

2-01 MANUFACTURERS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated into the work include but are not limited to, the following:
 - 1. Gypsum Board and Related Products:
 - a. Domtar Gypsum Co.
 - b. Georgia Pacific Corp.
 - c. Gold Bond Building Products Div., National Gypsum Co.
 - d. United States Gypsum Co.

2-02 GYPSUM BOARD PRODUCTS:

- A. General: Provide gypsum board of types indicated in maximum lengths available to minimize end-to-end butt joints.
- B. Gypsum wallboard: ASTM C36, and as follows:
 - 1. Width: 48 inches
 - 2. Type: Regular
 - 3. Type: X

4. Type: Water Resistant, ASTM C-630 at toilet and shower room walls
5. Edges: Tapered
6. Thickness: 5/8"

C. Fasteners:

1. 5/8" thick wallboard wood construction: ASTM C1002 for fastening gypsum wallboard to wood stud members, Type S Bugle Head.

2-03 TRIM ACCESSORIES:

A. Accessories: Comply with ASTM C 1047.

1. Material: Formed sheet steel, zinc coated by hot dip process. Minimum 26 gage.
2. Edge trim shapes: Reference designations Fig 1, ASTM C 1047.
 - e. LC Bead
 - f. Cornerbead
 - g. Expansion joint

2-04 JOINT TREATMENT MATERIAL:

- A. General: Comply with ASTM C 475, ASTM C 840, and recommendations of manufacturer of gypsum board and joint treatment materials for applications indicated.
- B. Joint Tape for Gypsum Board: Paper reinforcing tape.
- C. Drying Type Compound for Gypsum Board: Factory packaged, vinyl based products complying with the following:
 1. Factory pre-mixed.
 2. Taping compound formulated for embedding tape and for first coat over fasteners and flanges of cornerbeads and edge trim.
 3. Topping Compound: Formulated for fill (second) and finish (third) coats.

2-05 TEXTURE FINISH PRODUCTS:

- A. Prep Coat: Hamilton prep Coater or USG Prime Coat.
- B. Texture Finish Materials:
 1. Primer: As recommended by texture manufacturer.
 2. Available Products: Subject to compliance with requirements, manufacturers offering products which may be incorporated into the work include but are not limited to, the following:

- a. Imperial QT Spray Medium Texture Finish - United States Gypsum Corp.
- b. Imperial QT Spray Coarse Texture - United States Gypsum Corp.
- c. Perfect Spray Medium - Gold Bond Building Products Div., National Gypsum Co.
- d. Perfect Spray Coarse - Gold Bond Building Products Div., National Gypsum Co.

2-06 MISCELLANEOUS MATERIALS:

- A. General: Provide auxiliary materials for gypsum board construction complying with referenced standards and recommendations of gypsum board manufacturer.
- B. Acoustical Sealant: Type C-2 as specified in Section 07900 Sealants and Calking.

PART 3: EXECUTION

3-01 EXAMINATION:

- A. Examine substrates to which drywall construction attaches or abuts, preset hollow metal frames, cast-in-anchors, and structural framing, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of drywall construction. Do not proceed with installation until unsatisfactory conditions have been corrected.

3-02 APPLYING AND FINISHING GYPSUM BOARD:

- A. Gypsum Board Application and Finishing Standards: Comply with the following:
 - 1. ASTM C 840 Standard Specification for Application and Finishing of Gypsum Board.
 - 2. GA-214 Recommended Specification; Levels of Gypsum Board Finish.
 - 3. GA-216 Recommended Specifications for the Application and Finishing of Gypsum Board.
- B. Sound Attenuation Insulation: Coordinate with Section 07200 Insulation. Insure insulation is in place where indicated on drawings prior to gypsum board application.
- C. Ceiling Board Panels: Install across framing members minimizing the number of abutting end joints. Avoid abutting end joints in the central area of each ceiling. Stagger adjacent panel end joints not less than one framing member.
- D. Gypsum Panels: Install face side out, do not install imperfect, damaged or damp panels. Butt panels together for light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force panels into place.
- E. Panel Joints: Locate end and edge joints over support members. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Avoid joints other than control joints at corners of framed openings.
- F. Hollow Metal Frames: Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frame.
- G. Concealed Spaces: Cover both faces of partitions with gypsum panels above ceilings.
 - 1. Except where concealed application is required for sound, fire, air or smoke ratings,

coverage may be accomplished with panel scraps of not less than 8 square feet in area.

2. Fit gypsum panels around ducts, pipes and conduits.
 3. Where partitions intersect open concrete coffers, joists and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profiles formed. Allow 1/4 inch to 3/8 inch wide joint to install sealant.
- H. Non-Load Bearing Partitions: Isolate perimeter of gypsum board at structural abutments. Provide 1/4 inch to 1/2 inch wide spaces at these locations and trim edges with U-bead edge trim where edges are exposed. Seal joints between edges with acoustical sealant.
- I. Attachment:
1. Wood Framing: Specified fasteners at ceilings and partitions.

3-03 GYPSUM BOARD APPLICATION METHODS:

- A. Single Layer Application: Install gypsum board panels as follows:
1. Ceilings: Apply prior to partition panel application at right angles to main framing members.
 2. Partitions: Apply gypsum panels horizontally (perpendicular to framing) in maximum length panels to minimize end joints.
 - a. Stagger end joints not less than one framing member in alternate courses of board.
- B. Attachment:
1. Single Layer Fastening Methods: Apply gypsum panels to supports as follows:
 - a. Fasten with specified fasteners:
 - (1) 8" o.c. ceilings
 - (2) 8" o.c. partitions

3-04 INSTALLING TRIM ACCESSORIES:

- A. General: Fasten trim accessories with back flanges to framing with same fasteners used for gypsum panels or as recommended by accessory manufacturer for type, length and spacing of fasteners.
- B. Cornerbead: Install at external corners.
- C. Edge Trim: Install where edge of gypsum board would otherwise be exposed.
1. L-C bead: Install where gypsum panels are tightly abutted to other construction and back flange can be attached to supporting substrate.
 2. L-bead: Install where edge trim can only be installed after gypsum panels are installed.
- D. General: The Drawings do not purport to show all locations and all requirements for metal trim in

connection with the work of this section. Carefully study the drawings and the installation; provide in place all metal trim normally recommended by the manufacturer of the gypsum wallboard used.

- E. Installation: Install the metal trim in strict accordance with the manufacturer's recommended methods of installation, providing not less embedment and finishing that specified above for corner treatment

3-05 JOINT TREATMENT

A. General:

1. Inspect all areas to be joint treated, ascertaining that the gypsum wallboard fits snugly against supporting framework.
2. In areas where joint treatment and compound finishing will be performed, maintain a temperature of not less than 55 degrees F for 24 hours prior to commencing treatment, for the entire period of treatment, and until joint and finishing compounds have dried.
3. Apply the joint treatment and finishing compound by machine or hand tool.
4. Provide a minimum drying time of 24 hours between coats, with additional drying time in poorly ventilated areas.

- B. Embedding Compound: Apply to gypsum wallboard joints and fasteners heads in a thin uniform layer. Spread the compound not less than 3" wide at joint, center the reinforcing tape in the joint, and embed the tape in the compound. Then spread a thin layer of compound over the tape. After this treatment has dried, apply a second coat of embedding compound to joints and fastener heads, spreading in a thin uniform coat to not less than 6" wide at joints, and feather edged. When thoroughly dry, sandpaper to eliminate ridges and high points.

- C. Finishing Compound: After embedding compound is thoroughly dry and has been completely sanded, apply a coat of finishing compound to all joints and fastener heads. Feather the finishing compound to not less than 12" wide. When thoroughly dry, sandpaper to obtain uniformly smooth surfaces, taking all necessary care to not scruff the paper surface of the wallboard.

3-06 FINISHING:

- A. General: Apply joint treatment at gypsum board joints (both directions), interior angles, flanges of cornerbeads, edge trim, control joints, penetrations, fastener heads, surface defects and elsewhere as required to prepare gypsum board surfaces for decoration.

- B. Pre-fill open joints rounded or beveled edges, and damaged areas using setting type joint compound.

- C. Apply joint tape over gypsum board joints and to trim accessories with concealed face flanges as recommended by trim accessory manufacturer and as required to prevent cracks from developing in joint compound at flange edges.

- D. Levels of Gypsum Board Finish: Provide the levels of gypsum board finish conforming to GA-214.

1. Level 1 for ceiling plenum areas, concealed areas.
2. Level 2 for water resistant gypsum board beneath F.R.P., tile or other substrate.
3. Level 3 for gypsum board surfaces indicated to receive medium- or heavy-textured finishes before painting.

4. Level 4 for gypsum board surfaces indicated to receive light-textured finishes, wallcoverings, and flat paints over light textures.
 5. Level 5 for gypsum board surfaces indicated to receive gloss and semigloss enamels, nontextured flat paints, and where indicated.
- E. Where Level 5 gypsum board finish is indicated, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories; and apply a thin, uniform skim coat of joint compound over entire surface. For skim coat, use joint compound specified for third coat, or a product specially formulated for this purpose and acceptable to gypsum board manufacturer. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects, tool marks, and ridges and ready for decoration.
 - F. For Level 4 gypsum board finish, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.
 - G. Where Level 3 gypsum board finish is indicated, embed tape in joint compound and apply first and fill (second) coats of joint compound.
 - H. Where Level 2 gypsum board finish is indicated, embed tape in joint compound and apply first coat of joint compound.
 - I. Where Level 1 gypsum board finish is indicated, embed tape in joint compound.

3-02 PREP COAT:

- A. After taping and sanding of joints and trim is completed, vacuum dust from floors, walls and ceilings leaving walls, floors and ceilings clean.
- B. Coat walls with one full coat of surface preparation according to manufacturers recommendations.

3-03 APPLYING TEXTURE FINISH:

- A. Surface preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes according to texture finish manufacturer's instructions. Apply primer only to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish to gypsum panels and other surfaces indicated to receive texture finish according to texture finish manufacturer's directions. Using powered spray equipment acceptable to texture finish manufacturer, produce a uniform texture matching approved field samples and free of starved spots or other evidence of thin application or of application patterns.
- C. Finishes: Comply with finish as scheduled or noted and as defined by Drywall Industry Trust Fund, 9800 Sepulveda Blvd. Los Angeles, California 90005, Phone (213) 776-4555 or (415) 568-4060.
 1. Schedule Designation / Finish
 - G.B.1 - Fog and Splatter
 - G.B.2 - Skip Trowel
 - G.B.3 - Ceiling Texture (Heavy Finish)
 - G.B.4 - Smooth

- G.B.5 - Knock Down
- G.B.6 - Fog
- G.B.7 - Orange Peel (Light)
- G.B.8 - Orange Peel (Heavy)
- G.B.9 - Roller Texture
- G.B.10 - Swirl Texture

- D. Except when surface is scheduled to receive gloss or semi-gloss painter's finish or when specifically noted otherwise, provide light orange peel GB7.
- E. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray as recommended by texture finish manufacturer to prevent damage.

3-04 CLEANING AND PROTECTION:

- A. Promptly remove any residual joint compound from adjacent surfaces.
- B. Provide final protection and maintain conditions, in a manner suitable to installer, that ensures gypsum board assemblies remain without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 09665

SHEET VINYL FLOORING

PART 1: GENERAL

1-01 SUMMARY:

- A. Included: Sheet Vinyl flooring, base and edgings as scheduled and shown on the Drawings and specified herein.
- B. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specifications, apply to this Section.

1-02 SUBMITTALS:

- A. Product Data: Within 35 calendar days after Notice to Proceed, submit:
 - 1. Complete materials list of all items proposed to be furnished and installed under this Section.
 - 2. Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.
 - 3. Manufacturer's recommended installation procedures.
- B. Samples for color selection purpose: submit manufacturers standard color samples in the form of actual sections of Sheet Vinyl flooring including accessories, showing full range of colors and patterns available for each type of flooring and accessory required.
- C. Maintenance Instructions: Submit two (2) copies of manufacturers recommended maintenance practices for each type of flooring and accessory.

1-03 QUALITY ASSURANCE:

- A. Manufacturer: Provide Sheet Vinyl flooring and accessories as produced by a single manufacturer, including recommended primers, adhesives, sealants and leveling compounds.
- B. Installers: Use workmen who are thoroughly trained and experienced in the installation of vinyl composition tile and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1-04 PROJECT CONDITIONS:

- A. Maintain minimum temperature of 65degrees F in spaces to receive sheet vinyl flooring for at least 48 hours prior to installation, during installation and for not less than 48 hours after installation. Store sheet vinyl flooring materials in spaces where they will be installed for at least 48 hours before beginning installation. Subsequently maintain minimum temperature of 55 degrees F in areas where work is completed.

- B. Install flooring and accessories after other finishing operations, including painting, have been completed. Do not install flooring over concrete slabs until the latter have been cured and are sufficiently dry to achieve bond with adhesive as determined by resilient flooring manufacturers recommended bond and moisture test.

PART 2: PRODUCTS

2-01 ACCEPTABLE MANUFACTURERS:

- A. Design: Design is based upon Medintech as manufactured by Armstrong. Stair treads and skirting are based upon Burke. Reference to these manufacturers shall be construed only as establishing the quality of materials and workmanship applicable to the work of this Section and shall not be construed as limiting competition.
- B. Products: Products used shall be those upon which design is based, or shall be equivalent products reviewed by the Architect in advance of incorporating into the work.
- C. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to the following:
 - 1. Manufacturers of Sheet Vinyl Flooring:
 - a. Armstrong World Industries, Inc.
 - b. Azrock Floor Products Div., Azrock Industries, Inc.
 - c. Mannington Commercial
 - d. Tarkett, Inc.
 - 2. Manufacturers of Rubber Wall Base:
 - a. Armstrong World Industries, Inc.
 - b. Azrock Floor Products Div., Azrock Industries, Inc.
 - c. Flexco, Div., Textile Rubber Co.
 - d. Johnson Rubber Co., Inc.
 - e. Kentile Floors, Inc.
 - f. Mercer Plastics Co., Inc.
 - g. Vinyl Plastics, Inc.
 - h. Fire Test Data: Material shall meet or exceed the following requirements.
 - ASTM E 649 Flooring Radiant Panel Critical Radiant Flux – 0.45 watts/cm² or more, Class I
 - ASTM E 662 Smoke chamber Specific Optical Smoke Density – 450 or less

2-02 MATERIALS:

A. Sheet Vinyl Flooring:

1. Sheet Vinyl: .080 gauge non-layered, nonbacked Medintech sheet flooring 6' wide, meeting the wear layer gauge and composition, flexibility indentation and solvent-resistance requirements of Federal Specification L-F-475A (3), Type II, Grade A. The following shall be homogeneous vinyl composition with design elements consisting of through-grained vinyl granules and the pattern shall extend uniformly through the entire thickness of the floor. Colors will be selected from the current range manufactured by Armstrong by the Architect.
2. Sheet vinyl flooring to have a minimum coefficient of friction of 0.6 per ASTM D2047.
3. Sheet vinyl shall have a 6" high cove base.

B. Accessories:

1. Welding Rod: Product of floor covering manufacturer in color matching field color of sheeting.
2. Base Accessories:
 - a. Fillet Strip: 3/4" radius fillet strip compatible with resilient sheet material.
 - b. Cap Strip: Recommended by flooring manufacturer, approved by Architect.
3. Edgestrip: 1/8" thick, homogeneous vinyl, tapered or bullnose type as approved by Architect.

C. Adhesives: Waterproof, stabilized type as recommended by flooring manufacturer to suit material and substrate conditions.

D. Concrete Slab Primer: Non-staining type as recommended by flooring manufacturer.

E. Leveling and Patching Compounds: Latex types as recommended by flooring manufacturer.

2-03 OTHER MATERIALS:

A. Materials not specifically described but necessary to properly complete the work and to assure proper performance shall be new and of first quality as selected by Contractor subject to review by the Architect.

PART 3: EXECUTION

3-01 INSPECTION:

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.
- B. Conduct bond test as recommended by the tile manufacturer.

- C. Surface shall be smooth, level, at the required finish elevation, without more than 1/8" in 10'-0" variation from level or slopes shown.
- D. Do not allow flooring work to proceed until subfloor conditions are satisfactory.

3-02 PREPARATION:

- A. Concrete Subfloors: Verify that concrete slabs comply with ASTM F710.
 - 1. Installer shall examine surfaces on which resilient sheet flooring is to be installed, and shall advise Contractor, in writing, of areas which are unacceptable for installation of flooring material. Installer shall advise Contractor which methods are to be used to correct conditions that will impair proper installation. Installation shall not proceed until unsatisfactory conditions have been corrected.
 - 2. Slab substrates dry, free of curing compounds, sealers, hardeners, and other materials which would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by Resilient Floor Covering Institute recommendations in manual RFCI-MRP.
- B. Broom or vacuum clean substrates to be covered by sheet vinyl floor coverings immediately before installation. Following cleaning, examine substrates to determine if there is visually any evidence of moisture, alkaline salts, carbonation, or dust.
- C. Primer: If recommended by flooring manufacturer, prior to application of adhesive, apply concrete slab primer in accordance with manufacturer's directions.

3-02 INSTALLATION:

- A. General:
 - 1. Install tile only after all finishing operations, including painting have been completed and permanent heating system is operating. Moisture content of concrete slabs, building air temperature and relative humidity must be within limits recommended by tile manufacturer.
 - 2. Butt tightly to vertical surfaces, thresholds, nosing and edgings. Scribe as necessary around obstructions and to produce neat tight joints with even and straight lines.
 - 3. Extend into toe spaces, door reveals, and in closets and similar openings.
 - 4. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on the flooring as marked in the subfloor. Use chalk or other non-permanent marking device.
 - 5. Lay flooring from center marks established with principal walls, discounting minor off-sets, so that tile at opposite edges of the room are of equal width. Adjust as necessary to avoid use of cut widths less than 3' at room perimeters. Lay flooring square to room axis.
 - 6. Match flooring for color and pattern.
 - 7. Lay flooring in pattern selected by Architect.

- B. Edgestrips: Place the resilient edgestrips tightly butted to flooring and secure with adhesive. Provide edgestrips at all unprotected edges of flooring.

3-03 INSTALLATION OF INTEGRAL COVED BASE:

- A. Set preformed cove to receive base. Install base material with adhesive and terminate exposed edge with cap strip. Integral base shall be 150 mm (6 inches) high.
- B. Internal and external corners shall be formed to geometric shape generated by cove at either square or radius corners.

3-04 WELDING:

- A. Heat weld all joints of flooring and base using equipment and procedures recommended by flooring manufacturer.
- B. Welding shall consist of routing joint, inserting a welding rod into routed space, and terminally fusing into a homogeneous joint.
- C. Upon completion of welding, surface across joint shall finish flush, free from voids and recessed or raised areas.
- D. Fusion of Material: Joint shall be fused a minimum of 65 percent through thickness of material, and after welding shall meet specified characteristics for flooring.

3-05 CLEANING:

- A. Remove excess adhesive or other surface blemishes from tile, using neutral type cleaners recommended by the flooring manufacturer.

3-06 FINISHING:

- A. After completion of the Work and immediately prior to final inspection, thoroughly clean floors and accessories. Apply wax and buff, with the type of wax, number of coats, and buffing procedures recommended by the manufacturer.

END OF SECTION

SECTION 09900

PAINTING

PART I: GENERAL

1-01 SUMMARY:

- A. Included: Paint or otherwise finish all interior and exterior exposed surfaces, except as specifically excluded herein and as customarily excluded by general practices of the industry.
- B. Work Not Included:
 - 1. Do not include painting which is specified under other sections.
 - 2. Unless otherwise indicated, painting is not required on surfaces in concealed areas and inaccessible areas such as furred spaces, foundation spaces, utility tunnels, pipe spaces and duct shafts.
 - 3. Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze, and similar finished materials will not require painting under this Section except as may be specified herein.
 - 4. Do not paint any moving parts of operating units; mechanical or electrical parts such as valve operators, linkages, sensing devices, and motor shafts, unless otherwise indicated.
 - 5. Do not paint over any required labels or equipment identification, performance rating, name, or nomenclature plates.
 - 6. Do not paint piping, conduit, panels and similar items in mechanical rooms, except when mechanical, storage, janitor or other such rooms are scheduled to receive a painters or integrally colored finish.
- C. Related Sections:
 - 1. Paint: Priming or priming and finishing of certain surfaces are specified to be factory performed or installer performed under other pertinent sections.

1-02 DEFINITIONS:

- A. All coating system materials include primers, emulsions, epoxy, enamels, sealers, fillers, and other applied materials whether used as prime, intermediate, or finish coats.

1-03 SUBMITTALS:

- A. General: Submit the following according to Conditions of the contract and Division 1 Specifications Sections.
- B. Product Data: For each paint system specified:

1. Manufacturer's technical information, including label analysis, instructions for handling, storage and application of each material.
 2. Material listing by cross referencing specific coating, finish system and application. Identify each material by the manufacturers catalog numbers and classification.
 3. Indicate by transmittal that a copy of each manufacturer's instructions have been submitted to the applicator.
- C. Certification: Manufacturers certification that products supplied comply with local regulations controlling use of volatile organic compounds (V.O.C.'s)
- D. Samples: Provide manufacturers color charts for initial color selection.
- E. Samples: For verification purposes provide four 12"x12" swatches of color and finish for each system specified on actual substrate and texture scheduled to receive finishes.

1-04 QUALITY ASSURANCE:

- A. Qualifications of Manufacturers: Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of painting products and with a history of successful production acceptable to the Architect.
- B. Applicator Qualifications:
1. Provide at least one person who shall be present at all times during execution of the work of this Section, who shall be thoroughly familiar with the specified requirements and the materials and methods needed for their execution, and who shall direct all work performed under this Section.
 2. Provide adequate numbers of workmen skilled in the necessary crafts and properly informed of the methods and materials to be used.
- C. Single-Source Responsibility: Provide primers and undercoat paint products produced by the same manufacturers as the finish coats.
- D. Paint Coordination:
1. Provide finish coats which are compatible with the prime coats used.
 2. Review other sections of these Specifications as required, verifying the prime coats to be used and assuring compatibility of the total coating system for the various substrata.
 3. Upon request, furnish information on the characteristics of the specific finish materials to ensure that compatible prime coats are used.
 4. Provide barrier coats over noncompatible primers, or remove the primer and reprime as required.
 5. Notify the Architect in writing of anticipated problems in using the specified coating systems over prime coating supplied under other sections.

E. Field Samples: On wall surfaces and other exterior and interior components, duplicate finishes of prepared samples. Provide full-coat finish samples on at least 100 sq. ft. of surface until required sheen, color, and texture are obtained; simulate finished lighting conditions for review of in-place work.

1. Final acceptance of colors will be from job-applied samples.
2. The Architect will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted. Apply coatings in this room or surface according to the schedule or as specified.
 - a. After finishes are accepted, this room or surface will be used to evaluate coating systems of a similar nature.

1-05 PRODUCT HANDLING:

A. Delivery of Materials: Deliver all materials to the job site in original, new, and unopened containers bearing the manufacturer's name and label showing at least the following information:

1. Name or title of the material
2. Product description
3. Manufacturer's stock number and date of manufacture
4. Contents by volume, for pigment and vehicle constituents
5. Thinning instructions
6. Application instructions
7. Color name and number
8. M.S.D.S. sheets for each product specified.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg. C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1-06 JOB CONDITIONS:

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F. (10 deg C) and 90 deg F (32 deg C).

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 deg. F (7 deg C) and 95 deg F (35 deg C).

- C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.

1-07 PROTECTION:

- A. Protect adjacent surfaces from damage or defacement resulting from the work of this Section.

1-08 EXTRA STOCK:

- A. Amount: Upon completion of the work of this Section, deliver to the Owner an extra stock equaling 5% of each color, type, and gloss of paint used on the work.
- B. Packaging: Tightly seal each container and clearly label with the contents and location used.

PART 2: PRODUCTS

2-01 PAINT MATERIALS:

- A. Design is based upon the use of paint products manufactured by ICI Dulux Paint Co., and the systems of that manufacturer are listed in the SCHEDULE OF PAINT SYSTEMS included in PART 3 of this Section. Commensurate products and systems of Dunn Edwards, PPG Industries, Sherwin-Williams Company, Kelly- Moore or approved equal will be considered for approval. Products must comply with requirements of current regulations of the California Air Resources Board and local authority having jurisdiction.
- B. Durability: Provide paints of durable and washable quality. Do not use paint materials which will not withstand normal washing as required to remove pencil marks, ink, ordinary soil, and similar material without showing discoloration, loss of gloss, staining, or other damage.
- C. Colors and Glosses: The Architect will select colors to be used in the various types of paint specified and will be the sole judge of acceptability of the various glosses obtained from the material proposed to be used in the work.
- D. Undercoats and Thinners: Provide undercoat paint produced by the same manufacturer as the finish coat. Use only the thinners recommended by the paint manufacturer, and use only to the recommended limits. Insofar as practicable, use undercoat, finish coat, and thinner material as parts of a unified system of paint finish.

2-02 APPLICATION EQUIPMENT:

- A. General: For application of the approved paint, use only such equipment as is recommended by the manufacturer of the particular paint, and as reviewed by the Architect.
- B. Compatibility: Prior to actual use of application equipment, use all means necessary to verify that the proposed equipment is actually compatible with the material to be applied and that the integrity of the finish will not be jeopardized by use of the proposed application equipment.

2-03 OTHER MATERIALS: All other materials, not specifically described but required for a complete and proper installation of the work of this Section, shall be new, first-quality of their respective kind, and as selected by the Contractor subject to review by the Architect.

PART 3: EXECUTION

3-01 SURFACE CONDITIONS:

- A. Inspection: Prior to installation of the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where the work of this Section may properly commence. Verify that painting may be completed in strict accordance with the original design and with the manufacturers' recommendations as reviewed by the Architect.
- B. Discrepancies: Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

3-02 MATERIALS PREPARATION:

- A. General:
 - 1. Mix and prepare painting materials in strict accordance with the manufacturer's recommendations.
 - 2. Store materials not in actual use in tightly covered containers.
 - 3. Maintain containers used in storage, mixing, and application of paint in a clean condition, free from foreign materials and residue.
- B. Stirring: Stir all materials before application and as required during application to produce a uniform mixture. Do not stir surface film which may develop into the material; strain the material if necessary before using.

3-03 SURFACE PREPARATION:

- A. General:
 - 1. Perform all preparation and cleaning procedures in strict accordance with the paint manufacturer's recommendations as approved by the Architect.
 - 2. Remove all removable items which are in place and are not scheduled to receive paint finish, or provide surface-applied protection prior to surface preparation and painting operations.
 - 3. Following completion of painting in each space or area, reinstall the removed items by using workmen skilled in the necessary trades.
 - 4. Clean and prepare each surface to be painted prior to applying paint or surface treatment.
 - 5. Schedule the cleaning and painting so that dust and other contaminants from the cleaning process will not fall onto wet newly painted surfaces.

B. Preparation of Wood Surfaces:

1. Clean all wood surfaces until they are free from dirt, oil, and all other foreign substance.
2. Smooth all finished wood surfaces exposed to view, using the proper sandpaper. Where so required, use varying degrees of coarseness in sandpaper to produce a uniformly smooth and unmarred wood surface.
3. Unless specifically directed by the Architect, do not proceed with painting of wood surfaces until the moisture content of the wood is 12% or less as measured by a moisture-meter.

C. Preparation of Metal Surfaces:

1. Thoroughly clean all surfaces until they are completely free from dirt, oil, and grease.
2. On galvanized surfaces, prepare per paint manufacturer's recommendations for specified paint system.
3. Allow to dry thoroughly before application of paint.

D. Preparation of Concrete, Plaster or Gypsum Wallboard Surfaces:

1. Thoroughly clean all surfaces until they are free of dust, dirt, oil and grease.
2. Patch holes and cracks to render patch as imperceptible as reasonably possible.

E. Surfaces Not Mentioned:

1. Prepare surfaces not mentioned above in accordance with manufacturer's printed directions. In the absence of manufacturer's directions, prepare in accordance with procedures customarily employed, subject to review by the Architect.

3-04 PAINT APPLICATION:

A. General:

1. Slightly vary the color of succeeding coats. Do not apply additional coats until the complete coat has been inspected. Only the inspected and reviewed coats of paint will be considered in determining the number of coats applied.
2. Sand and dust between enamel coats to remove all defects visible to the unaided eye from a distance of five feet.
3. On all removable panels and all hinged panels, paint the back sides to match the exposed sides.

B. Drying:

1. Allow sufficient drying time between coats. Modify the period as recommended by the material manufacturer to suit adverse weather conditions.

- C. Brush Application: Brush out and work all brush coats onto the surfaces in an even film. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, and other surface imperfections will not be acceptable.
- D. Spray Application:
 - 1. Confine spray application to metal framework and similar surfaces where hand brush work would be inferior.
 - 2. Wherever spray application is used, apply each coat to provide the equivalent hiding of brush-applied coats. Do not double back with spray equipment for the purpose of building up film thickness of two coats in one pass.
- E. Exposed Plumbing, Mechanical and Electrical Items:
 - 1. Except when specified otherwise, paint conduits, pipes, ducts, grilles, registers, vents, access panels and similar items to match adjacent wall and/or ceiling finish. Paint visible surfaces behind registers, etc., flat black. Do not paint valve stems and bonnets.
- F. Doors: In addition to both faces of doors, paint all four edges. Paint surfaces inaccessible after doors are installed prior to hanging.
- G. Repainting: Extend finish material to a corner or similar transitional line, i.e., blend-in paint at patched area. When required, painting an entire wall may be necessary to achieve a reasonably imperceptible appearance at patched area.
- H. Completed work shall match the approved samples for color, texture, and coverage. Remove, refinish, or repaint all work not in compliance with specified requirements.

3-05 PAINT SYSTEMS:

- A. Paint system scheduled and noted on drawings. Refer to the complete corresponding paint systems as hereinafter specified. Major areas only are scheduled, but all miscellaneous items and areas within the room or space shall be treated with a suitable system.
- B. The number of coats specified is the minimum number acceptable. If full coverage is not obtained with the specified number, additional coats shall be applied without additional cost to the Owner, as necessary to produce a finish acceptable to Architect.

3-06 SURFACES NOT SPECIFIED:

- A. Other surfaces not included in the above schedule but which are scheduled or otherwise required to be painted shall be prepared and painted with a system selected by the Contractor subject to Architect's review.

PAINT SYSTEMS SCHEDULE

Surface		Finish Schedule Designation			Manufacturer's System Designation	
A. Interior						
(1)	Gypsum Drywall	P12.A	Flat, Latex Emulsion	First Coat Second Coat Third Coat	1030 1210 1210	Pigmented PVA Sealer Ultra Hide Ultra Hide
		P12.B	Semi-Gloss Latex Emulsion	First Coat Second Coat Third Coat	1030 1416 1416	Pigmented PVA Sealer Ultra Hide Ultra Hide
		P12.C	Eggshell Enamel Latex	First Coat Second Coat Third Coat	1030 1412 1412	Pigmented PVA Sealer Ultra Hide Ultra Hide
		P12.D	Semi-Gloss Enamel, Alkyd	First Coat Second Coat Third Coat	1030 4306 4306	Pigmented PVA Sealer Devguard Devguard
	(Textured)	P12.E	Flat	One Coat	1251	Speed Wall
(2)	Interior Wood	P13.A	Semi-Gloss Latex	First Coat Second Coat Third Coat	1020 1416 1416	Undercoater Ultra Hide Ultra Hide
		P13.B	Eggshell Enamel, Latex	First Coat Second Coat Third Coat	1020 1412 1412	Undercoater Ultra Hide Ultra Hide
		P13.C	Semi-Gloss Enamel Alkyd	First Coat Second Coat Third Coat	1120 4306 4306	Ultra Hide Devguard Devguard
		P13.D	Lacquer Flat	Stain First Coat Second and Third Coat	1700 200-0012 500-0036	Wood Pride Gemini 550 VOC Sanding Sealer High Solids Flat Lacquer 550 VOC
		P13.E	Lacquer Satin	Stain First Coat Second and Third Coat	1700 200-0012 500-0035	Wood Pride Gemini 550 VOC Sanding Sealer Gemini 550 VOC High Solids Satin Lacquer
		P13.F	Lacquer Semi-Gloss	Stain First Coat Second and	1700 200-0012 500-0034	Wood Pride Gemini 550 VOC Sanding sealer Gemini 550VOC

Surface		Finish Schedule Designation			Manufacturer's System Designation	
				Third Coat		High Solids Semi-Gloss Lacquer
		P13.G	Lacquer Gloss	Stain First Coat Second and Third Coat	1700 200-0012 500-0033	Wood Pride Gemini 550 VOC Sanding Sealer Gemini 550 VOC High Solids Gloss Lacquer
		P13.H	Varnish Flat	Stain First Coat Second and Third Coat	1700 1802 1802	Wood Pride Stain Prime Sealer Flat Varnish
		P13.I	Varnish Velvet	Stain First Coat Second and Third Coat	1700 1802 1802	Wood Pride Wood Pride Wood Pride
		P13.J	Varnish Semi-Gloss	Stain First Coat Second and Third Coat	1700 1806 1806	Wood Pride Wood Pride Wood Pride
		P13.K	Fire Retardant Intumescent Paint (sheen as selected by Architect)	First Coat Second and Third Coat		Water base sealer as recommended by manufacturer. Flame Coat or Bar Flame or approved equal
		P13.L	Waterborne Epoxy Semi-Gloss	First Coat Second Coat Third Coat	3210 4406 4406	Griper Tru-Glaze-WB Tru-Glaze-WB
(3)	Interior Ferrous Metal	P14.A	Flat Latex	First Coat Second Coat Third and Fourth Coat	4141 4141 1210	Red White Ultra Hide
		P14.B	Semi-Gloss Latex	First Coat Second Coat Third and Fourth Coat	4141 4141 1416	Red White Ultra Hide
		P14.C	Eggshell Latex	First Coat Second Coat Third and Fourth Coat	4141 4141 1412	Red White Ultra Hide
		P14.D	Semi-Gloss	First Coat Second Coat	4141	Red White

Surface		Finish Schedule Designation			Manufacturer's System Designation	
			Alkyd	Third and Fourth Coat	4141 4306	Devguard
		P14.E	Waterborne Epoxy Semi-gloss	First Coat Second Coat Third Coat	4030 4406 4406	Tru-Glaze-WB Tru-Glaze-WB Tru-Glaze-WB
		P14.F	Aquacrylic Dryfall Semi-gloss Primer & Finish	One Coat	1486	Spraymaster Pro
(4)	Interior Galvanized Metal/Aluminum	P15.A	Flat Latex	First Coat Second Coat	4020 1210	White Ultra Hide
		P15.B	Semi-Gloss Latex	First Coat Second Coat Third Coat	4020 1416 1416	White Ultra Hide Ultra Hide
		P15.C	Eggshell Latex	First Coat Second Coat Third Coat	4020 1414 1414	White Ultra Hide Ultra Hide
		P15.D	Semi-Gloss Alkyd	First Coat Second and Third Coat	4360 4306	Devoe Devguard Primer Devoe Devguard Enamel
(5)	Interior Plaster, Concrete, Brick, Stucco	P16.A	Flat Latex	First Coat Second and Third Coat	1060 1210	Primer Sealer Ultra Hide
		P16.B	Semi-Gloss Latex	First Coat Second and Third Coat	1060 1416	Primer Sealer Ultra Hide
		P16.C	Eggshell Latex	First Coat Second Coat Third Coat	1060 1414 1414	Primer Sealer Ultra Hide Ultra Hide
		P16.D	Semi-Gloss Alkyd	First coat Second and Third Coat	1060 4306	Primer Sealer Devoe Devguard Enamel
(6)	Interior Concrete Block	P17.A	Flat latex	First Coat Second Coat Third Coat	3010 1210	Prep & Prime Block Filler Ultra-Hide

Surface		Finish Schedule Designation			Manufacturer's System Designation	
		P17.B	Semi-Gloss Latex	First Coat Second and Third Coat	3010 1416	Block filler Ultra Hide
		P17.C	Eggshell Latex	First Coat Second Coat Third Coat	3010 1414 1414	Block filler Ultra Hide Ultra Hide
		P17.D	Semi-Gloss Alk,d	First Coat Second Coat Third Coat	4000 4306	Devoe Blox Fil Devoe Devguard Enamel
(7)	Interior Acoustical Ceiling Tile/ Plaster	P18.A	Latex	One Coat to Cover	1251	Speed Wall
B. Exterior						
(1)	Exterior Plaster, Concrete	P50.A	Flat, Acrylic Emulsion	First Coat Second Coat	6001 2200	Dulux Hydrosealer Dulux
		P50.B	Low Sheen Enamel Acrylic	First coat Second Coat	6001 2402	Dulux Hydrosealer Dulux Satin
		P50.C	Flat Latex	First Coat Second Coat	6001 2210	Dulux Hydrosealer Ultra Hide
		P50.D	Elastomeric (Smooth) 5 yr. warranty	First Coat Second Coat Spray Application	6001 2260 50-60	Dulux Hydrosealer Decra Flex Sq. Ft. per Gallon
		P50.E	Elastomeric (Medium Aggregate) 5 yr. warranty	First Coat Second Coat	6001 3230-4340	Dulux Hydrosealer Buildtex
		P50.F	Elastomeric (Coarse Aggregate) 5 yr. warranty	First Coat Second Coat	6001 3230-4350	Dulux Hydrosealer Buildtex
(2)	Exterior Concrete Block	P51.A	Flat, acrylic emulsion	First Coat Second and Third Coat	3010 2200	Prep & Prime Block Filler Dulux
		P51.B	Flat Latex	First Coat Second and Third Coat	3010 2210	Prep & Prime Block Filler Ultra Hide

Surface		Finish Schedule Designation			Manufacturer's System Designation	
	Exterior Masonry	P51.C	Elastomeric Smooth 5 Yr. warranty	First Coat Second Coat Spray Application	3010 2260 50-60	Prep & Prime Block Filler Decra Flex Sq. Ft. per Gallon
		P51.D	Elastomeric (Medium Aggregate) 5 yr warranty	First Coat Second Coat	4000 3230-4340	Prep & Prime Block Filler BuildTex
		P51.E	Elastomeric (Coarse Aggregate) 5yr warranty	First Coat Second Coat	3010 3230-4350	Prep & Prime Block Filler Buildtex
		P51.F	Clear Water Repellent		1 coat	Rainguard Micro Seal (10 yr. warranty)
(3)	Exterior Wood	P53.A	Flat Acrylic Emulsion	First Coat Second Coat Third Coat	6001 2200 2200	Hydrosealer Dulux Dulux
		P53.B	Flat Latex	First Coat Second Coat Third Coat	6001 2010 2010	Hydrosealer Ultra hide Ultra hide
		P53.C	Semi-Gloss Acrylic	First Coat Second Coat Third Coat	6001 2406 2406	Hydrosealer Dulux Dulux
		P53.D	Low Sheen Enamel Acrylic	First Coat Second Coat Third Coat	6001 2402 2402	Hydrosealer Dulux Dulux
		P53.E	Gloss; Alkyd Enamel	First Coat Second Coat Third Coat	6001 4309 4309	Hydrosealer Devoe Devguard Devoe Devguard
		P53.F	Flat, Stain Oil Base Semi-Transparent	First Coat Second Coat	2610 2610	Wood Pride Wood Pride
		P53.G	Flat, Stain Opaque	Two Coats	2600	Wood Pride
		P53.H	Varnish Clear Gloss	Three Coats	1808	Wood Pride
		P53.I	Stain and Varnish	First Coat Second Coat	1700 1808	Wood Pride Wood Pride
	Interior Wood					

Surface		Finish Schedule Designation			Manufacturer's System Designation	
				Third Coat	1908	Wood Pride
(4)	Exterior Ferrous Metal	P55.A	Flat Acrylic	First Coat Second Coat Third and Fourth Coat	4141 4141 2200	Red White Dulux
		P55.B	Flat Latex	First Coat Second Coat Third and Fourth Coat	4141 4141 2010	Red White Ultra Hide
		P55.C	Semi-Gloss	First Coat Second Coat Third and Fourth Coat	4141 4141 2406	Red White Dulux
		P55.D	Gloss	First Coat Second Coat Third and Fourth Coat	4141 4141 4208	Red White Devoe Devflex Enamel
		P55.E	Elastomeric	First Coat Second Coat Spray Application	4141 4141 2260	Red White Decra Flex 300
(5)	Exterior Galvanized Metal	P56.A	Flat, Acrylic Emulsion	First Coat Second and Third Coat	4020 2200	Devoe Devflex White Dulux
		P56.B	Flat, latex	First coat Second and Third Coat	4020 2010	Devoe Devflex White Ultra Hide
		P56.C	Semi-Gloss	First Coat Second and Third Coat	4020 2406	White Dulux
		P56.D	Gloss	First Coat Second Coat Third and Fourth Coat	4020 4208 4208	Devoe Devflex White Devoe Devflex Enamel Devoe Devflex Enamel
		P56.E	Elastomeric	First Coat Second Coat Spray	4020 2260	Devoe Devflex White Decra Flex 300

Surface		Finish Schedule Designation			Manufacturer's System Designation	
				Application	50-60	Sq. Ft. per Gallon
(6)	Exterior Aluminum	P58.A	Flat, Acrylic Emulsion	First Coat Second Coat Third Coat	4020 2200 2200	Devoe Devflex White Dulux Dulux
		P58.B	Flat, latex	First Coat Second Coat Third Coat	4020 2210 2210	Devoe Devflex White Ultra Hide Ultra Hide
	Exterior Aluminum	P58.C	Semi-Gloss Enamel	First Coat Second Coat Third Coat	4020 2406 2406	Devoe Devflex White Dulux S/G Enamel Dulux S/G Enamel

END OF SECTION

SECTION 10265

CORNER GUARD PROTECTION SYSTEMS

PART 1: GENERAL

1-01 SUMMARY:

- A. Section Includes:
 - 1. Corner Guards
- B. Related Sections:
 - 1. Section 06101 – Rough Carpentry
 - 2. Section 09260 - Gypsum Wallboard
- C. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section

1-02 SUBMITTALS:

- A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for each wall surface protection system component and installation accessory required, including installation methods for each type of substrate. Provide written data on each required components including physical characteristics, such as durability.
- C. Samples for Verification Purposes: Submit the following samples, prepared from the same material to be used in the Work, for verification of color, pattern, and texture selected and for compliance with requirements indicated:

1-03 QUALITY ASSURANCE:

- A. Installer Qualifications: Engage an experienced installer who has previously installed wall surface protection systems similar in material, design, and extent to the systems indicated for this Project.
- B. Design Criteria: The drawings indicate the size, profile and dimensional requirements of wall surface protection system components required and are based on the specific types and models indicated. Wall surface protection system components by other manufacturers may be considered provided deviations in dimensions and profiles are minor and do not change the design concept as judged by the Architect. The burden of proof of equality is on the proposer.

1-04 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials to project site in original factory wrappings and containers, clearly labeled with identification of manufacturer, brand name, quality or grade, and fire hazard classification.

- B. Store wall surface protection materials in original undamaged packages and containers inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1-05 MAINTENANCE:

- A. Maintenance Instructions: Provide the manufacturer's instructions for maintenance of installed work. Include recommended methods and frequency for maintaining optimum condition under anticipated traffic and use conditions. Include precautions against cleaning materials and methods that may be detrimental to finishes and performance.

PART 2: PRODUCTS

2-01 MANUFACTURERS:

- A. Acceptable Manufacturers: IPC Door and Wall Protection Systems, Inpro Corp., or equivalent.

2-02 MATERIALS:

- A. Corner Guards: Surface mounted Tape-on 3396 or equivalent color to match cove base.
- B. Material: .080" thick rigid surface mount.

2-03 FABRICATION:

- A. General: Fabricate wall corner protection systems to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thicknesses of components.
- B. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of evidence of wrinkling, chipping, uneven coloration, dents, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.
- C. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors for interconnection of members to other construction.
- D. Provide inserts and other anchorage devices for connecting components to concrete or masonry. Fabricate anchoring devices to be capable of withstanding imposed loads. Coordinate anchoring devices with the supporting structure.

PART 3: EXECUTION

3-01 EXAMINATION:

- A. Examine areas and conditions in which wall surface protection components and wall protection systems will be installed. Complete all finishing operations, including painting, before beginning installation of wall surface protection system materials.

3-02 PREPARATION:

- A. General: Prior to installation, clean substrate to remove dust, debris, and loose particles.

3-03 INSTALLATION:

- A. General: Install wall surface protection units plumb, level, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished work.
- B. Install aluminum retainers, mounting brackets, and other accessories in strict accordance with the manufacturer's instructions.

3-04 CLEANING:

- A. General: Immediately upon completion of installation, clean covers and accessories using a standard ammonia based household cleaning agent. Clean metal components in accordance with the manufacturer's recommendations.
- B. Remove excess adhesive using methods and materials recommended by manufacturer.
- C. Remove surplus materials, rubbish, and debris resulting from installation upon completion of work and leave areas of installation in neat, clean condition.

END OF SECTION

SECTION 10410

ARCHITECTURAL LETTERS AND NUMERALS

PART 1: GENERAL

1-01 SCOPE:

- A. Included: Furnish all labor and materials necessary and required to provide architectural letters and numerals as noted and specified herein.

1-02 SUBMITTAL:

- A. Shop Drawings: Shop drawings showing letter style, layout and attaching method shall be submitted for review by the architect.
- B. Color/Material Samples: Color/material samples shall be submitted for review by the architect.

PART 2: PRODUCTS

2-01 MATERIALS AND CONSTRUCTION:

- A. Room Identification Signage: All sign indicated below shall fully comply with all requirements of the Americans with Disabilities Act and CBC T24, including, but not limited to requirements for character height, character proportion, contrast, braille characters, mounting height and symbols of accessibility.
 - 1. Furnish and all building and room signs as indicated on the drawings. Install unframed, non-illuminated room identification plaques, Series 100 as manufactured by the Vomar Products, Inc., Company or equivalent. The plaque material shall consist of .125 inches thick satin matte finish opaque acrylic with integral color. The copy color shall be standard white, and the plaque background colors will be selected by the Architect from the full range of standard colors. All plaques shall be installed using tamper-proof screws. All graphics shall be front surface graphics, system no. 1.
 - 2. All graphics shall utilize the Helvetica Medium Style. Letters shall be upper and lower case. The plaque sizes shall be of sufficient size to allow for proper and adequate margins on all sides of the graphics.
- B. Additional Signage:
 - 1. Provide all other additional signs as indicated on the Drawings, including but, not limited to: No Smoking signs, International symbol of Accessibility, international symbol for the Hearing Impaired, Occupancy Load signs, Fire Extinguisher signs, Fire Exit Only signs, No Entry signs, Emergency Shower signs, Emergency Eyewash signs, Wash Hands sign, "Use Stairs" signs, "Caution Radiation Area" signs, "Authorized Personnel Only" signs, "Workstation" signs, tactile exit and exit route signs.

PART 3: EXECUTION

3-01 INSTALLATION:

- A. Letters and Numerals shall be carefully spaced and accurately set in line, both vertically and horizontally and the overall inscription shall be arranged in such a manner to present the best composition possible. Holes of not more than 1/16" larger in diameter than the anchor studs shall be carefully and neatly drilled in material upon which letters are to be mounted to assure a clean and uncluttered appearance.

END OF SECTION

SECTION 10426

DISABLED ACCESS IDENTIFICATION PLAQUES

PART I: GENERAL

1-01 SUMMARY:

- A. Section Includes: Identification Plaques.
- B. Related Sections:
 - 1. Section 10410 Architectural Letters and Numerals
- C. Related Documents: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specifications sections, apply to this Section.

1-02 REFERENCES:

- A. The Americans with Disabilities Act of 1990
- B. CBC T24 Parts 2, 3 and 5
- C. ANSI 117.1

1-03 SUBMITTALS:

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specifications.
- B. Product Data:
 - 1. Manufacturer's material specifications
- C. Shop Drawings indicating:
 - 1. Dimensions
 - 2. Gauges
 - 3. Graphics
 - 4. Signage Schedule
- D. Samples:
 - 1. Provide manufacturer's color charts consisting of actual sections of material including the full range of colors available.

1-04 QUALITY ASSURANCE:

- A. Single-Source Responsibility: For each separate type of sign required, obtain signs from one source from a single manufacturer.

- B. Design Criteria: The drawings indicate sizes, profiles, and dimensional requirements of signs. Other signs with deviations from indicated dimensions and profiles may be considered, provided deviations do not change the design concept. The burden of proof of equality is on the proposer.

PART 2: PRODUCTS

2-01 MANUFACTURERS:

- A. Available Manufacturers: subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, but are not limited to, the following:
 - 1. Manufacturers of Panel Signs:
 - a. Nelson-Harkins Industries
 - b. ASI Sign Systems, Inc.

2-02 MANUFACTURED UNITS:

- A. Plaque: System TS450 by Nelson-Harkins Industries or equivalent.
 - 1. Letters: Graphics and Braille photoblasted copy raised 1/32" above photoblasted contrasting background.
 - 2. Braille: Contracted Grade 2 Braille shall be used wherever Braille symbols are specifically required in these Specifications. Dots shall be 1/10 inch (2.54 mm) on centers in each cell with 2/10 inch (5.08 mm) space between cells. Dots shall be raised a minimum of 1/40 inch (0.635 mm) above the background. All signs and identification shall comply with Title 24, Sections 1117B.5-1117B.5.10.
 - 3. Frames: TFS 60 round synthetic composite.

PART 3: EXECUTION

3-01 INSTALLATION:

- A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
- B. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
- C. Signage and Graphics: Contracted Grade 2 Braille shall be used wherever Braille symbols are specifically required. Dots shall be 1/10 inch (2.54 mm) on centers in each cell with 2/10 inch (5.08 mm) space between cells. Dots shall be raised a minimum of 1/40 inch (0.635 mm) above the background, in accordance with the California Building Code.

3-02 WALL MOUNTED SIGNS:

- A. Mechanically fasten over mounting surfaces as follows:
 - 1. Gypsum Wallboard: Tamperproof screws into:
 - a. Wood stud backing

2. Hollow Metal Doors: Tamperproof screws and liquid adhesive.
3. Solid Core Wood Doors: Tamper-proof screws.
4. Provide signs at all public entries

3-03 CLEANING AND PROTECTION:

- A. At completion of the installation, clean soiled sign surfaces in accordance with the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION

SECTION 11400

FOOD SERVICE EQUIPMENT

PART ONE – GENERAL

1-01 WORK COVERED

- A. Items of work included in this section are labor, material, tools, equipment and transportation as follows:
1. Furnishing, setting-in-place and installation of all equipment indicated on the drawings to be performed by competent workmen with a minimum of five (5) years in the food service industry.
 2. Coordinating with work of other trades and providing support and accommodation of related work.
 3. Work involved in the making and installation of stands and support for equipment.
 4. Cutting of all holes in equipment, including holes for pipes, drains, electrical outlets, required for this section. Work shall include welded sleeves, collars, ferrules or escutcheons.
 5. Repair of all damage including paint replacement to building equipment, if specified under itemized number.
 6. Mechanical and electrical devices furnished in place for final connection to the respective building utility system by others.
 7. Installation shall comply with California Seismic Restraints, if required by California Codes.

1-02 RELATED WORK IN OTHER SECTIONS AND PERFORMED BY OTHER TRADES:

- A. All electrical, water and waste service to rough-in points final connections and interconnections to equipment. Final connections to equipment shall include all material and labor necessary to pipe or wire to the equipment complete ready for operation, the extension of all indirect waste lines to floor sinks or standpipes, the continuance of pipe or wiring from utility distribution systems; the continuance of piping to water troughs with the appropriate controls, the vacuum breakers, the continuance of wiring from junction box to lights, door heaters, vents and light fixtures in appliances. The term includes all items listed including existing re-used and vendor furnished items.
- B. All ventilating work and ducts above finished ceiling. All exhausters and make-up air units. The welded transition between duct and ventilation. Unless otherwise specified.
- C. All concrete work, including curbs, gutters, raised base, floor depressions, cement finishings and tile overlay, including cold storage room floors and covered bases.
- D. Finish floor sealing or covering.

- E. Color and pattern selection of paints, stains and plastic laminate material.
- F. All wall backing for support of equipment.

1-03 BASE BID AND SUBSTITUTIONS

- A. Base bid shall be for furnishing all equipment and material as specified.
- B. Acceptance of proposed substitution is entirely at discretion of owner or his representative and subject to the following qualifications:
 - 1. Equal in quality of materials used, in structural strength and in details of construction.
 - 2. Equal in performance, mechanically and productivity.
 - 3. Equal in finish or in characteristics permitting specified finish to be applied.
 - 4. Availability of replacement parts and maintenance service.

1-04 DRAWINGS

- A. Drawings furnished constitute a part of these specifications. They show locations of equipment and the general arrangement of mechanical and electrical services. Necessary deviation from the illustrated arrangements to meet structural conditions shall be considered a part of the work in this section.
- B. The Drawings are for the assistance and guidance of the Contractor. Exact locations shall be governed by the Building Configuration.

1-05 REGULATORY AGENCIES

- A. All work shall be in accordance with the governing health, building and safety, and fire protection codes and regulations.
- B. Standards of the National Sanitation Foundation (NSF) shall serve as guidelines for the work of this Section.
- C. All electric equipment and accessories shall conform to the standards of the National Electric Manufacturers Association (NEMA), Underwriters Laboratories, Inc. (UL) or the local Electric Testing Station.
- D. Underwriters Laboratories: Foam panels up to 5" thick with painted or unpainted steel or aluminum facings shall generate a flame spread of 25 and smoke developed of 450 or less. UL file: R13780
- E. Factory Mutual: Panels up to 5" thick shall meet the approval requirements of the FM Standard 4880. Panels shall be approved for use as insulated core walls and ceiling panels up to a maximum height of 30 feet (9.1 meters) without the need for sprinkler protection in and of themselves.
- F. Underwrites Laboratories- Door Assemblies: Door assemblies shall be listed under U.L file numbers: E61954 and E225993.

- G. California Bureau of Home Furnishings and Thermal Insulation: Product shall be licensed.
- H. Rulings and interpretations of state and local enforcing agencies shall be considered a part of the regulations, including local health department.

1-06 MANUFACTURER'S INSTRUCTIONS

- A. Manufacturer's directions shall be used in this contract covering points not shown or noted in the drawings or specifications.

1-07 MANUFACTURER'S LITERATURE

- A. Submit seven (7) bound sets of Manufacturer's Specifications and data sheets, describing articles and equipment, as specified, for approval.
 - 1. Each submittal must show item number, units to be furnished, manufacturer's model number and list optional finish and accessories to be supplied. In addition, show electrical characteristics and BTU Rating.
- B. Bound submittals shall be complete, accounting for each specified "Buy-out" (Standard Equipment) item. Loose sheets or "piecemeal" submittals shall not be acceptable. If a manufacturer's catalog sheet is not obtainable for a specific item, insert a typewritten sheet describing the item giving all of the required information.

1-08 SHOP DRAWINGS

- A. Prepare and submit preliminary shop drawings, showing all information necessary for fabrication and installation of the work of this section, for approval, as described in Section 01300.
 - 1. Furnish 3/4" scale elevation and 1 1/2" scale vertical cross section, dimension, drawings of fabrication details.
- B. Show all materials, gauges and methods of construction, including relation to adjoining and related work when cutting or close fitting is required.
 - 1. Reproductions of original contract drawings are not acceptable for use as Shop Drawing submittals.
- C. Provide seven (7) prints of approved shop drawings for distribution.
- D. Submit color samples of materials for color selection by the Architect.

1-09 MAINTENANCE DATA AND OPERATING INSTRUCTIONS

- A. Submit for approval, in accordance with Section 01010 for owner's use, three (3) bound sets of operating and maintenance instructions containing complete description, wiring diagrams, operating data and other information pertaining to the proper operation and upkeep of the various items of mechanical equipment having motors or other moving parts.
 - 1. Include names, addresses and telephone numbers of authorized service agencies, for all items with mechanical equipment.

1-10 GUARANTEES/WARRANTIES

- A. New equipment furnished for this food service facility shall be guaranteed for a period specified in the supplementary general conditions. Guarantee shall protect against defective material, design and workmanship.
- B. In addition to the above, all self-contained refrigeration equipment shall include installation, start-up and an additional four year extended warranty on sealed compressor/motor assemblies. The extended warranty shall include parts only.
- C. Upon receipt of notice of failure of any part, during the guarantee period, the affected part of parts shall be replaced promptly at no cost to the owner.
- D. In the event the replacement of an entire item is required, the owner shall have the option of full use of the defective equipment until a replacement has been delivered and completely installed.
- E. All repairs and replacements shall be made at a time and during hours satisfactory to the owner.

PART TWO – PRODUCTS

2-01 WALK IN REFRIGERATION

- A. General
 - 1. The walk in shall be prefabricated, all metal clad, sectional constructed and be designed for easy, accurate field assembly with provisions to extra panels to increase size. Thermalrite or equivalent.
- B. Panel Construction:

4” panels shall consist of foamed-in-place polyurethane insulation sandwiched between the interior and exterior metal pans that have been die formed and gauged for uniformity. Perimeter panel framing shall be Thermalrite high-density urethane tongue and groove rails with cam locking fasteners to assure airtight joints and structural strength to the panels. Cam locks shall be no more than 48” apart. All panels shall have factory applied NSF approved gasket. Panels shall all be manufactured to exact dimensions.
- C. Insulation:

Non-CFC urethane insulation shall have a 97% closed cell structure Class 1 rated urethane foam has thermal conductivity (K factor) of .106-.136 depending on the operating temperature BTU/hr./sq. ft. per degrees Fahrenheit/inch. Four-inch panels have a K-value of 33. All foam panels are supplied with class 1 fire rated insulation and complete panel assembly is certified by Underwriters Laboratory (UL) as having a flame spread of 25 or less and smoke generation of 450 or less when tested in accordance with ASTM-E-84. This rating is not intended to reflect hazards presented by this or any other material under actual fire conditions.

D. Floor Construction

1. Floor Panels shall be fabricated similar to other panels and are reinforced to readily withstand uniformly distributed loads of 1000 lbs. per square foot. Floor will be recessed. Floor will be covered concrete wearing floor.
2. All pre-fabricated floor panels shall have a built in integral NSF radius cove and all wall panels shall lock to the floor panels using the same cam lock systems.

E. Metal Finishes

1. Exterior walls shall be: 26 gauge stucco-embossed white galvanized
2. Interior walls and ceiling shall be: .032 stucco embossed aluminum
3. Interior floor shall be: .09 mil aluminum

F. Panel Locking Assemblies

Assembly of walk-ins shall be accomplished by cam locking fasteners, which shall be foamed-in-place and activated by a hex wrench provided by the manufacturer. Access ports shall be on interior of panels to allow assembly of walk-in from the inside and shall be covered by snap caps.

G. Panel Gaskets

Flexible N.S.F gaskets shall be applied on the interior and exterior edge of the “tongue” rail. Gaskets shall be impervious to stains, greases, oils and mildew.

H. Entrance Doors

1. Standard Thermalrite cold storage door is 36” x 78”, however, doors can be fabricated to fit any size opening.
2. The standard door construction shall be flush-mount type, finished interior and exterior, to match the wall in which it is located. Door and door section shall be listed by UL and equipped with the following:
 - a. Magnetic gasket
 - b. “Posi-Seal” door closer
 - c. Polished chrome deadbolt latch and cam-lift spring-loaded hinges
 - d. Latches shall have a safety release to prevent entrapment of personnel within the box.
 - e. Latches also have padlocking provisions
 - f. Self-closing hardware also available upon request
3. The door perimeter shall be constructed to incorporate a fiberglass molded pultrusion no less than 1/8” thickness, which is permanently foamed in place. Bottom of door shall have a double sweep gasket. Magnetic gasket shall be of a dart and ridge design that will allow for easy replacement by the end user

without the use of any tools. The door jamb shall be constructed of a fully welded anodized aluminum rigid frame. The perimeter of the frame shall be no less than two inches wide to provide integral backing to accommodate all required hardware. Freezer door jambs shall also have a 120-volt jamb and threshold heater with a snap-on easily removable stainless steel channel and a heated pressure relief vent assembly listed by UL

4. Each entrance door shall be provided with a 3-way rocker light switch with an indicating pilot light exterior. All switches are pre-wired and factory tested per UL. All light fixtures are optional.
5. When required, a threshold shall be provided with the door section. Heater wire shall continue beneath the threshold (freezer) in a raceway.
6. A digital thermometer shall be included with each door section to indicate inside temperature.

I. Partitions

Fabrication and finish of partition walls shall be the same as the walk-in walls and shall lock into wall, ceiling, floor panels, (if used) with cam locking assemblies. Tongue and groove foam surfaces shall provide the thermal break between cooler and freezer compartments.

J. NSF

All walk-ins shall be fabricated to comply with National Sanitation Foundation Standard No. 7. The NSF label shall be affixed to the interior door jamb. Interior corners and floor shall be coved to meet NSF specifications.

K. Installation Instructions

A Complete set of installation instructions shall be included with the walk-in. These instructions shall cover the erection and assembly of the walk-in and the installation of refrigeration systems. Shop drawings shall be included.

2-02 OPTIONAL FEATURES

- A. Dual 3-Way or 4-Way Switches: An exterior and interior 3-way press switch with pilot lights on each entrance door shall be provided. Pre-wired switches control interior light. Exterior pilot light indicates lights are "on". Interior pilot light is constant burning.
- C. 4 ½" dial thermometer
- D. Alarm Systems: A digital alarm thermometer which includes the following:
 1. LED display.
 2. Remote electronic sensor.
 3. Adjustable alarm set points.
 4. Flashing light when the walk-in temperature goes beyond acceptable operating limits.

5. Reset button to silence the audible alarm. The alarm will automatically revert to normal mode once temperature conditions are satisfied.
6. Battery backup to guard against power interruption.
7. Door ajar sensors.
8. Motion sensor to shut off lights when no movement is detected.

2-03 OPTIONAL DOOR ASSEMBLY ACCESSORIES

- A. View-Through Window: To provide vision into the walk-in room, a 14"x24" triplepane window will be used. For freezer applications or humid conditions, heated glass will be used. Window will be neatly trimmed and designed for replacement in the field. 14"X 14" view-through window also available.
- B. Locking Bar: Locking bar prevents opening of the door even if hinges and latch are removed. Locking bar assembly will be provided with inside safety release. (Padlocks by others.)
- C. Spring Hinge: A spring hinge to assist in closing the door. Spring hinge will be of a torsion-compression design.
- D. Strip Curtain: A clear strip curtain will be installed behind all entrance doors and withstand operating extremes of -20°F + 160°F.
- E. Thru-Ceiling Electrical: A thru-ceiling electrical assembly supplied at the entrance door to allow the door electrical components to be pre-wired through to the exterior ceiling.
- F. Kick Plate: 16 Ga. stainless steel or aluminum diamond treadbite kick plate on interior and/or exterior of all entrance doors.
- G. Jamb Guards: Protective jamb guards are available on the exterior and/or interior of door jamb.
- H. Rack & Pinion door closer with hold open feature.
- I. Door fan switch to shut off evaporator coils when door is open.
- J. Panic alarm to prevent personnel entrapment.

2-04 OPTIONAL FEATURES AND ACCESSORIES

- A. Trim Strips: Trim strips between walk-in and building walls provided where shown on drawings. Constructed and finished of same material as exterior of walk-in.
- B. Base Cove: Base cove to seal walk-in to building floor and facilitate easy cleaning. Base cove is constructed of same material and finish as walk-in wall.

2-05 REFRIGERATION SYSTEMS

Pre-assembled refrigeration systems shall consist of two major assemblies. The condensing unit assembly with all the necessary components, factory installed and wired, including the electrical box, time clock, drier, sight glass, pressure control and necessary tubing. The refrigeration coil assembly with expansion valve, solenoid and temperature control, all factory mounted.

- A. Condensing unit shall be hermetic, air coolers with rigid structural base, receiver, OSHA metal fan guard with venture openings, waterproof electrical system, exhaustible fusible plugs, internal inherent motor protection, suction line shut-off valves, liquid line shut-off valves, crankcase heaters.
- B. Cooler evaporating coils shall be low-profile, UL listed, NSF approved with in-line fans, cross fin staggered copper tubing, aluminum fan coils, aluminum cased, permanently lubricated motors with thermal overload protection, waterproof electrical system pre-wired to single connection, and slotted channel hangers. Coils are to be designed to operate above 34°.
- C. Freezer evaporating coils shall be low-profile UL listed, NSF approved with in-line fans, cross fin staggered copper tubing, aluminum fan coils, aluminum cased, heavy-duty motors with thermal overload protection, electrical defrost system, pre-wired water-proof electrical system, and slotted channel hanger. Coils are to be designed to operate from +34 ° to -20 ° temperature.
- D. Refrigerant shall be type R-404A in low and medium temperature systems.
- E. Refrigerant circuits shall have liquid line site glasses, filter driers, expansion valves, room thermostats interlocked with liquid line solenoid valves.
- F. Coil drains shall be 1" I.P.S. copper. Route and pitch ½" per foot to drain. Provide electric heaters on freezer drains.
- G. Refrigeration line insulation shall be minimum ½" thickness Armaflex AP pipe insulation, sealed with adhesive foam insulation. Tape fittings to sufficient thickness to prevent condensation.
- H. The entire system shall be cleaned and dehydrated by maintaining a vacuum of 500 microns, or lower, for a minimum period of five (5) hours. The vacuum pump used shall itself be capable of developing a vacuum of 50 microns with its valve in a closed position. The required operating charge of refrigerant and oil shall be added, and each system shall be tested for performance.
- I. Pre-assembled systems manufactured by Russel Refrigeration and/or Heatcraft Refrigeration or equivalent in accordance with specifications.
- J. EC Motors included for DOE compliance.

PART THREE -- EXECUTION

3-01 UTILITIES, STORAGE AND SPECIAL HANDLING

- A. The General Contractor will furnish and provide temporary power and light, openings and storage space to permit scheduled delivery of equipment.
- B. The equipment contractor shall verify door openings, passages and conditions at the building prior to submitting shop drawings.

3-02 CONDITIONS AND PREPARATION

- A. Verify all pertinent dimensions of the building and examine conditions affecting proper execution of this section. Evaluate access to various areas for moving in of equipment and coordinate with general contractor.
- B. Inspect flooring and raised concrete bases, wall finishes; verify existence of required mechanical and electrical rough-ins; check painting ceiling installation and all related work for readiness to receive installation of equipment.
- C. Coordinate with the project superintendent as to the proper sequence for installation of equipment and wall finish.
- D. Sweep clean all floor areas before setting equipment in place; remove any spillage of foreign matter.

3-03 EQUIPMENT CONNECTIONS

- A. Equipment shall be complete with connection terminals as standardized by equipment manufacturers, except where specified otherwise for others to make plumbing, and electrical final connection.

3-04 CLEANING

- A. All debris, crates and packages shall be removed and disposed of as designated by the Project Superintendent.
- B. All food service equipment shall be cleaned and ready for use when the facility is turned over to the owner.
 - 1. Protection of completed and cleaned work shall be the responsibility of the equipment contractor.

3-05 ADJUSTMENT OF EQUIPMENT AND DEMONSTRATION

- A. Turn on all mechanical equipment, test for leaks, poor connections, inadequate or faulty performance and correct if necessary; adjust for proper operation.
 - 1. All thermostatically controlled equipment and equipment with automatic features shall be operated for a sufficient length of time to prove controls are functioning as intended.
- B. At a time and date, selected by the owner, the equipment contractor shall arrange for a demonstration of all mechanical equipment for the owner and his representatives, to be conducted by representatives of the various equipment manufacturers, with the equipment contractor in attendance.

END OF SECTION

SECTION 15010

GENERAL MECHANICAL PROVISIONS

PART 1: GENERAL

1-01 GENERAL CONDITIONS:

- A. The preceding General and Special Conditions and Division 1 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 following Sections of Division 15 of these Specifications and shall be considered a part of these sections.

1-02 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
2. California Building Code – CBC - 2010
3. California Electrical Code - CEC – 2010
4. California Mechanical Code - CMC - 2010
5. California Plumbing Code - CPC – 2010
6. California Energy Code – CEEC – 2010
7. California Fire Code - CFC - 2007
8. California Green Building Standards Code – CAL Green – 2010
9. Air Diffusion Council - ADC
10. American Gas Association - AGA
11. Air-Conditioning, Heating and Refrigeration Institute - AHRI
12. Air Movement and Control Association - AMCA
13. American National Standards Institute - ANSI
14. American Society of Heating, Refrigerating, and Air Conditioning Engineers - ASHRAE

15. American Society of Mechanical Engineers - ASME
16. American Society for Testing and Materials - ASTM
17. American Water Works Association - AWWA
18. Cast Iron Soil Pipe Institute - CISPI
19. National Electrical Manufacturers Association - NEMA
20. National Fire Protection Association - NFPA
21. National Sanitation Foundation - NSF
22. Occupational Safety and Health Act - OSHA
23. Plumbing and Drainage Institute - PDI
24. Sheet Metal and Air Conditioning Contractors National Association - SMACNA
25. Underwriters' Laboratory - UL

1-03 PERMITS AND FEES:

- A. The Contractor shall take out all permits and arrange for all tests in connection with his work as required. All charges are to be included in the work.

1-04 COORDINATION OF WORK:

- A. Layout of materials, equipment and systems is generally diagrammatic unless specifically 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.

1-05 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 Engineer.

1-06 QUIETNESS:

- A. Piping, ductwork and equipment shall be arranged and supported so that vibration is a minimum and is not transmitted to the structure.

1-07 DAMAGES BY LEAKS:

- A. The Contractor shall be responsible for damages caused by leaks in the temporary or 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.

1-08 EXAMINATION OF SITE:

- A. The Contractor shall examine the site, compare it with Plans and Specifications, and shall be 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.

1-09 COMPATIBILITY WITH EXISTING SYSTEMS:

- A. Any work which is done as an addition, expansion or remodel of an existing system shall be compatible with that system.

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. 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:

1. 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.

- B. Substitutions: Manufacturers and model numbers listed in the specifications or on the drawings represent the standard of quality and features desired (where equipment is scheduled on the drawings, any equipment submitted other than scheduled equipment is considered a substitution). Unless otherwise noted, alternate manufacturers may be submitted for review by the Engineer. Calculations and other detailed data indicating how the item was selected shall be included. 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. 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:

- A. All work shall be scheduled subject to the review of the Architect, Engineer and the Owner. 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.

1-14 OPENINGS, CUTTING AND PATCHING:

- 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:

- A. General: Barrel of pipe shall have uniform support on sand bed. Sand shall be free from 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:
 - 1. 6" Below, Around, and to 12" Above Pipe: Material shall be sand. Place carefully 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.
- 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.

1-16 PROTECTIVE COATING FOR UNDERGROUND PIPING:

- A. All ferrous pipe below grade (except cast iron) shall have a factory applied protective coating of extruded high density polyethylene, 35 to 70 mils total thickness. Protective coating shall be extended 6" above surrounding grade. X-Tru-Coat, Scotchkote.
- B. 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.

1-17 ACCESS DOORS:

- A. Provide access doors as required where equipment, piping, valves, ductwork, etc. are not 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. 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 are not acceptable. 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. Maximum allowable stresses for tension and shear shall be 80% of the ICC ES test report values. Hilti, Phillips, Red Head, Wej-it.

1-20 EQUIPMENT ANCHORING:

- A. All equipment shall be securely anchored in accordance with CBC Section 1613A. All equipment mounted on concrete shall be secured with a concrete anchor as shown on drawings at each mounting point.

1-21 SUPPORTS AND SEISMIC RESTRAINTS:

- A. All mechanical systems (equipment, ductwork, piping, etc.) shall be provided with supports and seismic restraints in accordance with Seismic Hazard Level 'A' of the "Seismic Restraint Manual: Guidelines for Mechanical Systems, Appendix B" latest edition, as published by the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA), Chantilly, Virginia, or other OSHPD pre-approved system, and in accordance with CBC Section 1613A. 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.

1-22 ASBESTOS CONTAINING MATERIALS AND ASBESTOS REMOVAL:

- A. No materials or material coatings containing asbestos shall be allowed on this project.
- 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:

- A. 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-1). Provide 1/2" high lettering - white on black background. Nameplates shall be permanently secured to the exterior of the unit.
- 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.

1-24 CLEANING:

- A. Progressively and at completion of the job, the Contractor shall thoroughly clean all of his 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.

1-25 OPERATION AND MAINTENANCE INSTRUCTIONS:

- A. Printed: Three copies of Operation and Maintenance Instructions and Wiring Diagrams for 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-1). 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.
- B. Compact Disk: The Contractor shall provide three copies of compact disks containing the Operations and Maintenance Instructions and Wiring Diagrams as instructed per above requirements in PDF format.
- C. Verbal: The Contractor shall verbally instruct the Owner's maintenance staff in the operation and maintenance of all equipment and systems. The Engineer's office shall be notified 48 hours prior to this meeting.
- D. Acknowledgment: The Contractor shall prepare a letter indicating that all operation and maintenance instructions (printed and verbal) have been given to the Owner, to the Owner's satisfaction. This letter shall be acknowledged (signed) by the Owner and submitted to the Engineer.

1-26 RECORD DRAWINGS:

- A. The Contractor shall obtain one set of 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, sidewalks. In addition, the water, gas, sewer, underfloor duct, etc. within the building shall be recorded by offset distances from building walls. The original drawings will be made available to the Contractor from which he shall have a set of reproducible drawings made. The Contractor shall then 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

SECTION 15400

PLUMBING

PART 1: GENERAL

1-01 GENERAL MECHANICAL PROVISIONS:

- A. The preceding General Mechanical Provisions, Section 15010, shall form a part of this Section with the same force and effect as though repeated here.

1-02 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. Sanitary sewer system.
2. Domestic water system.
3. Storm drain system.
4. Drain system (including condensate drain).
5. All equipment as shown or noted on the drawings or as specified.
6. Miscellaneous systems (e.g. welding gases, etc.).
7. Demolition as indicated on drawings. Where demolition is called for, remove all equipment, piping, braces, housekeeping pads, supports and related items no longer required.
8. Lead Free: All equipment, fixtures, pipes, fittings, valves and fixture stops that convey or dispense water for human consumption must meet the "Lead Free" requirements for the State of California.

- B. Work Specified Elsewhere:

1. Line voltage power wiring, disconnect switches and installation of all starters are included in the Electrical Section unless otherwise noted.
2. Concrete and reinforcing steel unless specifically called for on the drawings or specifications.
3. Painting unless specifically called for in the drawings or specifications.
4. Carpentry.

PART 2: PRODUCTS

2-01 PIPING MATERIALS:

3990 PLUMBING

15400 - 1

A. Sanitary Sewer:

1. Soil, Waste and Vent Piping (Non-Pressurized):

a. Inside Building and Within Five Feet of Building Walls: 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, Tyler, JC Cast Iron, Star Pipe Products. 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.

(1) Size 2" and smaller above grade may be standard weight galvanized steel, ASTM A53, with coated cast iron recessed drainage fittings, ANSI B16.12.

(2) 2" and smaller exposed to view shall be galvanized steel, ASTM A53, with coated cast iron recessed drainage fittings, ANSI B16.12.

b. Outside Building: Polyvinyl chloride (PVC), SDR-35, ASTM D3034 with PVC fittings with rubber ring joints. Piping with less than 24" of cover outside building walls shall be cast iron.

2. Cleanouts: Comparable models of Josam, Mifab, Wade or Zurn are acceptable.

a. Floor Cleanouts: Smith 4028 with nickel bronze top in finished areas; Smith 4228 in utility areas.

b. Wall Cleanouts: Smith 4532 with stainless steel cover and screw.

c. Pipe Cleanouts: Iron body with threaded brass plug.

3. Cleanout Box: Precast reinforced concrete. Cast iron lid marked for service. Christy G5.

B. Storm Drain (Including Rain Water Leader, RWL): Same as Soil, Waste and Vent Piping, except as otherwise noted on drawings. Where exposed to view on exterior of building, piping shall be galvanized steel with recessed drainage fittings.

C. Water:

1. Cold and Hot Water Piping:

a. Inside Building, Within Five Feet of Building Walls, and All Above Grade:

(1) Hard temper seamless copper, ASTM B88. Wrought copper fittings, ANSI B16.22. Type L with brazed joints (1100F, min.). 1-1/2" and smaller above grade may be soldered, 95-5 tin-antimony solder. All nipples shall be red brass (85% copper). Above grade fittings may be copper (1/2" to 2") or "Lead Free" bronze (2-1/2" to 4") press fittings, ASME B16.18 or ASME B16.22. EPDM O-rings. Installation shall be in accordance with the manufacturer's installation instructions. ProPress.

b. Outside Building - Below Grade:

- (1) 2" and larger: Schedule 80 polyvinyl chloride (PVC) with solvent weld fittings where approved by administrative authority.
 - (2) 1½" and Smaller: Schedule 40 Polyvinyl chloride (PVC) with solvent weld fittings where approved by administrative authority.
 - (3) PVC Solvent Cement: Gray, heavy bodied, medium curing, industrial grade.
2. Valves and Specialties: All valves and specialties shall meet the new California "Lead Free" standard for domestic water service.
- a. Valves:
 - (1) General: Manufacturer's model numbers are listed to complete description. Equivalent models of Crane, Milwaukee, Nibco, Stockham or Walworth are acceptable. All valves of a particular type or for a particular service shall be by the same manufacturer.
 - (2) Gate Valve:
 - Aa. 1½" and Smaller: All bronze. Non-rising stem. Threaded bonnet. Wedge disk. Malleable iron handwheel. 200 psi WOG. Nibco T-113-LF.
 - Bb. 2" and Larger: Iron body, bronze mounted. Non-rising stem. Resilient wedge seat. 200 psi WOG. Flanged or AWWA hub end as applicable. Nibco F-619. Underground valves shall have square operating nut. Provide one operating "T" handle for underground valves.
 - (3) Check Valve: All bronze swing check, regrinding. 200 psi WOG. Nibco T-413-Y-LF. Check valves for air systems shall be the spring-loaded, quick-closing type, Nibco T-480-Y-LF.
 - (4) Ball Valve: Full port. Bronze or brass body, cap, stem, disk and ball. Screwed connection. Lever handle. TFE seat. O-ring seals. 300 psi WOG. Apollo, Nibco, Jomar.
 - (5) Valve Box: Precast reinforced concrete. Cast iron lid marked for service. Christy G5.
 - b. Miscellaneous Specialties:
 - (1) Union:
 - Aa. 2" and Smaller: AAR malleable iron, bronze to iron ground seat. 300 psi. Unions for copper piping shall be cast bronze. Anvil.
 - Bb. 2-1/2" and Larger: Grooved pipe, synthetic gasket, malleable iron housing. Victaulic Style 77, Type "E" gasket, Gruvlok.
 - (2) Dielectric Coupling: Insulating union or flange rated for 250 psig. EPCO.

- (3) Shock Absorber: Multiple bellows. All stainless steel construction. Designed and applied in accordance with PDI WH201. Amtrol, Smith, Wade, Zurn.
 - (4) Flexible Connection: Corrugated stainless steel core covered with high tensile stainless steel tubular braid. 150 psi working pressure. 2" and smaller shall have screwed connections. 2-1/2" and larger shall have flanged connections. Flexonics, Keflex.
- E. Drain Piping (including Condensate): Same as inside building cold water piping, except Type M copper.
- F. Miscellaneous Piping Items:
 - 1. Pipe Support:
 - a. Pipe Hanger: Steel "J" hanger with side bolt for piping 4" and smaller; 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.
 - c. Construction Channel: 12-gage, 1-5/8" x 1-5/8" galvanized steel channel. Single or multiple section. Self-locking nuts and fittings. B-Line, Anvil, Unistrut.
 - (1) Copper Pipe System: Pipe clamp with locknut and thermoplastic elastomer cushion. Cush-A-Clamp.
 - 2. Flashing: Vent flashing shall be 4 lb/sq. ft. lead, 16" sq. base flange, length sufficient to be turned down 2" into vent. Flashing for other piping through roof shall be prefabricated galvanized steel roof jacks with 16" sq. base flange. Provide clamp-on storm collar and seal water tight with mastic. For cold process built-up roof, material shall be 4 lb/sq. ft. lead instead of galvanized steel. For single-ply roofing, use the roofing manufacturer's recommended flashing material. Mayco, Oatey.

2-02 PIPING INSULATION MATERIALS:

- A. General: All piping 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. 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" minimum wide tape of same material as lap for butt joints. Thickness shall be 1" for freeze protection. Knauf, Johns-Manville, Owens-Corning.
- C. Fiberglass Blanket: 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. Stretchable Glass Fabric: Reinforcing mesh. 10x20 continuous filament glass yarns per inch. Johns-Manville.
- E. Vapor Barrier Coating: Childers CP-30, Foster 30-25.
- F. Lagging Adhesive: Childers CP-50A, Foster 30-36.
- G. 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.
- H. Aluminum Jacketing: Aluminum pipe and fitting jacketing. 0.016" thickness for straight pipe. 0.024" thickness for fittings. Stucco-embossed finish. Integral moisture barrier. Provide pre-fabricated aluminum strapping and seals by same manufacturer. Childers.
- I. Outdoor Mastic: Childers CP-10, Foster 65-05.
- J. Insulating Tape: Ground virgin cork and synthetic elastomeric. Black, odorless, and non-toxic. K factor 0.43 Btu-in/hr-ft²-F or less. Non-shrinking. For outdoor use, provide protective finish by same manufacturer. Halstead.
- K. Molded Closed Cell Vinyl (Piping Insulation Under ADA 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 73F. 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.

2-03 **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, Eljer, 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.
 - 1. Stops: All hot and cold water supplies shall be 1/2" I.P.S. inlet angle stops with stuffing box, loose key lock shield, and brass riser (3/8" for 2-1/2 gpm and less, otherwise 1/2"). McGuire, Speedway.
 - 2. P-Traps: Semi-cast brass, ground joint. 17-gage. Clean-out plug. Unobstructed waterway. California Tubular, McGuire.

2-04 **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. 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: 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:
 - 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, and 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, 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, unless otherwise noted. 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.
 - 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.

PART 3: EXECUTION

3-01 PIPING INSTALLATION:

A. General:

1. Piping Layout: Piping shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. All piping shall run parallel to building 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:
 - a. Threaded: Pipe shall be cut square and reamed to full size. Threads shall 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.
 - b. Welded or Brazed: Filler rod shall be of suitable or the same alloy as pipe. 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.
 - c. Open Ends: Open ends of piping shall be capped during progress of work to preclude foreign matter.
 - d. Electrical Equipment: Piping shall not be run over electrical panels, motor control centers or switchboards.
3. Fittings and Valves:
 - a. Standard Fittings: All joints and changes in direction shall be made with standard fittings. Close nipples shall not be used.
 - b. Reducers: Pipe size reduction shall be made with bell reducer fittings. Bushings shall not be used.
 - c. Unions: A union shall be installed on the leaving side of each valve, at all sides of automatic valves, at equipment connections, and elsewhere as necessary for assembly or disassembly of piping.

d. Valves: All valves shall be full line size. Provide shut-off valve for each 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.

(1) Ball valves shall not be installed below grade.

e. Valve Accessibility: All valves shall be located so that they are easily accessible.

(1) 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.

(2) Valves located below grade shall be provided with minimum 6" diameter pipe extended from top of valve to 6" of top of valve box.

4. Pipe Support:

a. 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:

Pipe Size (Inches)	Maximum Support Spacing* (ft.)		
	Copper	Sch. 40 steel	Sch 40 PVC and ABS DWV
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.
 - b. Cold Water Piping: All 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.
 - c. Trapeze: Trapeze hangers of construction channel and pipe clamps may be used. Submit design to Engineer for review.
- 5. Miscellaneous:
 - a. Escutcheons: Provide chrome plated metal escutcheons where piping penetrates walls, ceilings, or floors in finished areas.
 - b. Pipe Sleeves: All piping passing through concrete or concrete block wall shall be provided with pipe sleeves. Allow 1" annular clearance between sleeve and pipe or pipe insulation for piping 3" and smaller, otherwise 2" annular clearance.
 - c. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire 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 2010 CBC Section 713.
 - d. Dielectric Couplings: Dielectric couplings shall be installed wherever piping of dissimilar metals are joined, except that bronze valves may be installed in ferrous piping without dielectric couplings.
- B. Sanitary Sewer Piping:
 - 1. General: Where inverts are not indicated, sanitary sewer 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.
 - a. Cleanouts shall be installed with a wye 1/8 bend combination. End of line cleanouts and cleanouts at change of direction shall be installed with two 1/8 bends or long sweep 1/4 bend.
 - 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. Storm Drain (Including Rain Water Leader, RL): Similar to Sanitary Sewer. Piping with less than 24" of cover outside building walls shall be cast iron.
- D. 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 3/4", unless otherwise noted. All stub outs, including exposed fixture stops and flush valves, shall be installed with brass nipples or Type K copper 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.

- 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 all 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. Provide secondary drain piping where required.
- F. PVC 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.
 - 1. Water piping that rises up from below grade shall be Type L copper with brazed joints, wrapped with 40 mils of pipe wrap tape. Female PVC adapters shall not be used.
 - 2. Provide 18 AWG or better insulated tracer wire and secure to pipe with nylon ties at maximum 10' interval. Tracer wire shall terminate above ground at each end of piping.

3-02 PIPING INSULATION INSTALLATION:

- A. Domestic Hot Water:
 - 1. General: All domestic hot water piping, fittings and accessories shall be insulated.
 - 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:
 - a. 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" minimum 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. Cover with PVC jacketing where exposed to view, aluminum jacketing where exposed to weather.
- C. Piping Insulation Under ADA Accessible Lavatories and Sinks: Hot water piping, hot water stop and drain piping under ADA accessible lavatories and sinks shall be insulated with 1/8" thick molded closed cell vinyl. Installation shall be in accordance with manufacturer's installations.

3-03 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.

3-04 EQUIPMENT INSTALLATION:

- A. General: It shall be the responsibility of the equipment installer to insure 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.
- 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.

3-05 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.
3. Storm Drain: Similar to Sanitary Sewer.

C. Pressure Systems:

1. 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 Cold Water Piping: Maintain 100 psig water pressure for 4 hours.
3. Welding Gas Piping: Maintain 150 psig air pressure for 4 hours. Test in accordance with CCR, Title 8. Test medium must be oil free.

3-06 DISINFECTION:

- A. Disinfect all domestic water piping systems in accordance with AWWA Standard C651-05, "AWWA Standard for Disinfecting Water Mains", 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, water samples shall be collected for bacteriological analysis. Certificate of Bacteriological Purity shall be obtained and delivered to the Owner through the Architect.

END OF SECTION

SECTION 15650

HEATING, VENTILATING AND AIR CONDITIONING

PART 1: GENERAL

1-01 GENERAL MECHANICAL PROVISIONS:

- A. The preceding General Mechanical Provisions, Section 15010, shall form a part of this Section with the same force and effect as though repeated here.

1-02 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 16.
 - 3. System energy balance.
 - 4. Refrigeration system.
 - 5. Demolition as indicated on drawings. Where demolition is called for, remove all equipment, piping, braces, housekeeping pads, supports and related items no longer required.
- B. Work Specified Elsewhere:
 - 1. Connection of condensate drains to equipment.
 - 2. 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.
 - 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.

PART 2: PRODUCTS

2-01 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 2007 CMC Standard 6-2.

- 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).
- C. Flexible Ductwork: Insulated flexible ductwork. One pound per cubic foot glass fiber insulation, 1-1/2" thick (R-6). Thermal conductivity shall not exceed 0.25 Btu-in/hr-ft²-F at a mean temperature of 75F. 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 water static pressure and 4,000 FPM air velocity. Duct shall comply with NFPA 90A. JP Lamborn.
- D. Duct Sealants:
 - 1. Joints Exposed to Weather: Sealant shall be G.E. "Silglaze II" or Silimax Multipurpose Silicone Sealant, without substitution.
 - 2. Joints Not Exposed to Weather: Fiber reinforced. White in color. Design Polymerics DP1030, Hardcast Versa-Grip 102.

2-02 AIR TERMINALS AND DUCT FITTINGS:

- A. Grilles (Including Registers, Diffusers and Louvers):
 - 1. 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 and 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 Control Damper (VCD)
 - 1. VCD in Rectangular Ducts: 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.
 - 2. VCD in Round Duct: Damper blade full height of branch and 1" less than branch width.

3. 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 open end bearing for round ducts).
 4. All branch dampers that are inaccessible shall be provided with remote operators. Venlok 677.
- 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.
 - E. Flexible Connection: UL listed neoprene coated 30 ounce fiberglass cloth. 3" metal, 3" fabric, 3" metal. Ventglas.
 - F. Fire/Smoke Damper: California State Fire Marshal approved. UL listed and labeled indicating fire rating. Hour rating as required by the rating of the wall, ceiling, floor, etc. in which it is installed. Combination fire/smoke dampers shall have normally-closed, non-stall factory electric actuator rated for 250F (min.) and shall be Leakage Class II.
 - G. Duct Access Door: Insulated double wall door. Full piano hinge. Cam latch. Pressure rating to match application. Air Balance, Ductmate.

2-03 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 75F 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. Installed thermal resistance at a mean temperature of 75°F shall meet or exceed indicated value. One side coated to prevent fiber erosion up to 6000 FPM. 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.

2-04 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.
 - 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:
- a. Fan Curves: Performance curves shall be submitted for all units of 3000 CFM or greater. Operating point for forward curved fans shall be from point of maximum efficiency toward increased CFM limited by horsepower scheduled. Operating point for backward inclined fans shall be selected near point of maximum efficiency. Curves shall plot CFM verses static pressure with constant brake horsepower, RPM and efficiency lines.
 - b. 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:
- a. General: Tested and rated in accordance with ASHRAE Standard 52 - 76 and SFM 12-71-1, Part 12, 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. Weight arrestance 90%. MERV-8. Clean filter resistance 0.10" water at 300 fpm. Throw-away frame. Class 2. Camfil Farr 30/30.
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. Split System, Heat Pump:

1. General: Refer to Paragraph 2-04A for General Requirements. Completely assembled and factory tested. Provide all starters and relays required for operation. All components by same manufacturer. Carrier/Toshiba, Mitsubishi.
2. Outdoor Unit:
 - a. Compressor: Sealed hermetic rotary compressor with vibration isolator mountings. Crankcase heater, filter drier, suction line accumulator, recycling timer. High and low head pressure/temperature protection. Motor overload protection, low ambient feature to 20F cooling mode. High and low side service valves. Recycling timer. Single phase start assist kit. 5-year extended warranty.
 - b. Fan and Coil: Finned tube non-ferrous coil. Propeller type fan, 1200 RPM maximum, direct drive. Totally enclosed motor, overload protected, permanently lubricated, resiliently mounted.
 - c. Cabinet: Weatherproof, factory paint.
3. Indoor Unit:
 - a. Supply Fan: Direct drive, multi-speed forward curve, centrifugal fan, resiliently mounted. Thermally protected motor.
 - b. Indoor Coil: Copper tube, aluminum fin, DX coil.
 - c. Electric Heaters: Integral part of unit, complete with all operational and safety controls, single point wiring terminal, 5-year factory warranty, UL listed as a complete unit.
 - d. Condensate Pan: Install under complete coil area with drain connections.
 - e. Filter: Washable media. Class 2 or better.
4. Controls: Microprocessor control containing temperature selection, room temperature indication, automatic cooling/heating changeover, malfunction alarm, power failure automatic restart safety, and emergency operation function.

C. Exhaust Fans:

1. 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 2-04A for General Requirements. All direct drive fans shall be provided with unit mounted speed controllers, unless otherwise noted. All motors 1 HP and larger shall be the premium efficiency type.
2. Ceiling Fan: Direct driven, centrifugal exhaust fan. Fan wheel housing and integral outlet duct shall be 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 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, 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. Cook, Greenheck.

2-05 PIPING MATERIALS:

- A. Refrigerant Piping: Hard drawn Type ACR copper, dried and capped. Wrought copper fittings, silver alloy brazed, 1100F, Silfos. Size 3/8" and smaller shall be refrigerant tube, ASTM B280.
- B. Miscellaneous Piping Items:
 - 1. Pipe Support:
 - a. Pipe Hanger: Steel "J" hanger with side bolt for piping 4" and smaller; steel clevis hanger for piping 5" and larger. Load and jam nuts. Size and maximum load per manufacturer's recommendations. 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.
 - c. Construction Channel: 12-gage, 1-5/8" x 1-5/8" galvanized steel channel. Single or multiple section. Self-locking nuts and fittings. B-Line, Anvil, Unistrut.
 - 2. Flashing: Flashing for piping through roof shall be prefabricated galvanized steel roof jacks with 16" square base flange around pipe. Provide clamp-on storm collar and seal water tight with mastic. Maintain dielectric separation between copper and galvanized materials. For cold process built-up roof, material shall be 4 lb/sq. ft. lead instead of galvanized steel. For single-ply roofing, use the roofing manufacturer's recommended flashing material. Mayco, Oatey.

2-06 PIPING INSULATION MATERIALS:

- A. General: All piping 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. 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.
- C. 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. Childers.

- D. Outdoor Mastic: Childers CP-10, Foster 65-05.
- E. Foamed Plastic: Rubber based elastomeric preformed pipe insulation. Thermal conductivity shall not exceed 0.27 Btu-in/hr-ft²-F at a mean temperature of 70F. 1/2" thick. Provide adhesive by same manufacturer. Armstrong Armaflex.

PART 3: EXECUTION

3-01 DUCTWORK INSTALLATION:

- A. General:
 - 1. 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.
 - 2. 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. Ventlok 677 concealed remote actuator with zinc finish on cover.
 - 3. Flanges and Escutcheon: Where ductwork penetrates walls, ceilings, or floors, furnish and install flange or escutcheon of same material as duct.
 - 4. Flexible Connections: Connection of ductwork to any vibrating equipment shall be with 3" minimum flexible connection. Install with ample slack and uniform gap. There shall be no metal to metal contact across flexible connection. Flexible connections exposed to weather shall have a protective sheet metal cover.
- B. Low Velocity-Low Pressure, up to 2,000 FPM and up to 2.0 in Water Column:
 - 1. Sheet Metal Ductwork:
 - 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.
 - 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 7 feet of each branch duct. Example: one 7 foot section of flexible duct may be used to connect the grille to the sheet metal branch duct. No joints are permitted in this 7 foot length. Hangers shall be

4" wide metal straps spaced to prevent sagging, 42" maximum spacing. Insert 6" wide fiberglass pad between duct and hanging strap. Joints shall be installed with stainless steel or nylon draw bands, DuroDyne 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.

3-02 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.
- B. Fire/Smoke Damper: Shall be installed in accordance with the manufacturer's recommendations. Provide access doors as required, label per UBC. Manufacturer's instructions shall be available to the inspecting authorities. Shall be tested according to State Fire Marshal requirements.

3-03 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 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.
- D. Acoustic Lining: Unless otherwise indicated, all supply and return ductwork in equipment rooms including outside air intakes, all ductwork exposed to weather and other ducts as indicated on drawings, shall have acoustic lining. 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.

3-04 PIPING INSTALLATION:

- A. General:
 - I. 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. Lines shall be adequately braced against vertical and lateral movement. Pipe sizes indicated on the

- a. Escutcheons: Provide chrome plated escutcheons where piping penetrates walls, ceilings, or floors in finished areas.
 - b. Pipe Sleeves: All piping passing through concrete or concrete block shall be provided with pipe sleeves. Allow 1" annular clearance between sleeve and pipe or pipe insulation for piping 3" and smaller, otherwise 2" annular clearance.
 - c. Pipes Passing through Fire Rated Surfaces: Pipes passing through fire 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 2010 CBC Section 713.
 - d. Dielectric Couplings: Dielectric couplings shall be installed wherever piping of dissimilar metals are joined, except that bronze valves may be installed in ferrous piping without dielectric couplings.
- B. Refrigerant Piping: Pipe shall be cut square. Joint surfaces shall be thoroughly cleaned, fitted and erected before brazing. After installation, evacuate to 29 inches of mercury, ambient temperature during evacuation shall not be less than 70F. After evacuation, fill with dry nitrogen to 250 psi and maintain for two-hour period without additional charge. After nitrogen test, purge with refrigerant charged through dryer and maintain holding charge in system and equipment. Refrigerant piping below grade shall be run in 4" (min.) PVC conduit with long radius ells. Seal ends of conduit watertight.

3-05 PIPING INSULATION INSTALLATION:

- A. Refrigerant Piping: Cover piping (suction and liquid lines) with foamed plastic insulation. Longitudinal and end seams shall be thoroughly cemented with adhesive in accordance with manufacturer's recommendations. Cover all fittings, unions, valves and connections. Piping exposed to view shall be covered with PVC jacketing. Piping exposed to weather shall be covered with aluminum jacketing, seal all joints and seams with grey outdoor mastic or silver silicone sealant.

3-06 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.

3-07 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.

3-08 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 (AABC) or National Environmental Balancing Bureau (NEBB). 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 or NEBB standards.
- 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 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.
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.

3-09 TEMPERATURE CONTROL SYSTEM:

- A. Scope: The control system includes control panels, control devices, line and low voltage control and interlock wiring, conduit and related equipment as required for proper operation of all controlled systems. Control and interlock wiring includes wiring to controllers, switches, timers, relays, etc. Power wiring and disconnect switches are included in the Electrical Specifications except that power wiring required for control devices such as thermostats, valves, etc., is included in the control system.
- B. Type of system: The control system shall be electric/electronic.
- C. Contractor Qualifications: All controls shall be furnished and installed by a Contractor who is licensed, certified or contracted by the controls manufacturer 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 two 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.

D. Submittals: Submittals shall include the following:

1. Contractor qualifications. Manufacturer licenses, contracts or certifications for the installer shall be submitted on manufacturer's letterhead.
2. Manufacturer's data for all devices.
3. Diagrams showing control schematics. Diagrams shall include all sensors, terminal strips, panels and control devices. Locations of all devices shall be indicated.
4. Sequence of operation.

E. System Components:

1. Thermostats: Provide a 7-day programmable electronic thermostat with dual setpoints, function selectors, night setback function, occupant override, keypad lockout, non-volatile memory and LCD display. Honeywell, Johnson.
2. Wall Switches: Plates for all wall switches and timers shall match those specified in Division 16.
3. Labels: All labels, signs, etc. shall be engraved, laminated plastic, white on black background, 1/8" high lettering, minimum.

F. System Shall Function as Follows:

1. Heating/Cooling Units: Provide room thermostat with subbase if required. Room thermostat shall control the unit to maintain 75F in cooling mode or 70F in heating mode.
2. Exhaust Fans: See Schedule for control.
3. IDU/ODU: Units shall be controlled by integral factory controls.

G. Installation: 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. Set, test and adjust the system for proper operation.

H. Programming: The Contractor shall be responsible for programming the system and shall coordinate the scheduling (on/off times) with the Owner.

END OF SECTION

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Wiring devices and miscellaneous equipment.
 - 2. Lighting fixtures.
 - 3. Supporting devices for electrical components.
 - 4. Electrical identification.
 - 5. Concrete equipment bases.
 - 6. Cutting and patching for electrical construction.
 - 7. Touchup painting.
- B. Related Sections:
 - 1. Section: 16120 - Conductors and Cables.
 - 2. Section: 16130 - Raceways and Boxes.
- C. Scope of work includes, but is not limited to:
 - 1. Complete system of branch circuit wiring, conduit and distribution equipment for lights, receptacles and mechanical equipment power.
 - 2. Furnish and install a new lighting fixture system complete with lighting panel board, lamps, lighting fixtures, switching and controls as shown on the Drawings for the building addition.
 - 3. Furnish and install fire alarm initiation and annunciation devices for extension of existing intelligent fire alarm system for the building addition.
 - 4. Complete system of branch circuit wiring, conduit, and distribution equipment for fire alarm system extension.
 - 5. Furnish, install and connect wire, conduit and switches, etc. required for other equipment provided by other sections of these Specifications.
 - 6. The patching and repair of all work modified or damaged by the installation of work under this contract.
 - 7. Fused disconnect switches, etc., for equipment covered by other sections.
 - 8. All hangers, anchors, sleeves, chases and supports for fixtures, all electrical equipment and materials.
 - 9. Access openings, panels, etc., in the building construction where required for the maintenance of, installation and/or removal of all equipment, or other items of the various electrical systems and equipment.
 - 10. Demolition work as required to clear the way for the work of this project.

11. All excavation, backfill, concrete pads and bases required for electrical work.
 12. Include payment of all required insurance, permits, fees and taxes. Any inspection Certificates required for the completion of all work included in this Contract shall be obtained and delivered to the Owner.
- D. Work Not Included: The following work shall be done under Division 15 of these Specifications:
1. Furnishing of all electrical or partially electrical devices related uniquely to the mechanical equipment and only as specifically indicated in Division 15 of these Specifications.
 2. Furnishing and installation of all motors.
 3. Furnishing and installation of all equipment, such as solenoid valves which are to be installed in piping lines.
 4. Furnishing and installation of all conduit and wiring for temperature controls and energy management systems.
- E. The Contractor shall furnish and install all work necessary to make complete systems, whether or not such details are mentioned in these Specifications or shown on the drawings, but which are necessary in order to make complete working systems, excepting only those portions that are specifically mentioned therein or plainly marked on the accompanying drawings as being installed by other Contractors.
- F. The Contractor must coordinate his work with the work of other trades so as to provide raceways, conductors and outlets in the correct location for the equipment served, including all mechanical, and signal equipment and connect same. The Contractor must provide power of the correct voltage and phase to each item of equipment.
- G. Before construction starts, the Contractor shall arrange a coordination meeting with all other subcontractors supplying equipment that requires electrical connections. All electrical requirements shall be verified and any problems shall be immediately reported to the Architect. Equipment items to verify shall include but not be limited to: Voltage, amps, phase, location, orientation, space requirements, type of connection, starter and disconnect location and provision, power wiring interlock requirements for control system operation , etc.
- H. The Contractor shall provide a temporary construction power system that is adequate for this project. All 120V, 15A and 20A receptacles shall have ground fault circuit interrupter protection.
- I. The above listing is given only for the convenience of the Contractor and is not considered all-inclusive.

1.3 DEFINITIONS

- J. EMT: Electrical metallic tubing.
- K. FMC: Flexible metal conduit.
- L. IMC: Intermediate metal conduit.

M. LFMC: Liquidtight flexible metal conduit.

1.4 SUBMITTALS

A. Procedures: In Accordance with Section 01300.

B. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Codes and Regulations: Work done under this Section shall comply with the latest edition of the following: California Electrical Code, State of California Title 24, State Building Standards, Division of the State Architect (DSA) requirements, State of California Title 17 and to all local codes having jurisdiction. In the case where the codes have different levels of requirements, the most stringent rule shall apply.

C. Testing:

1. All circuits shall be tested for continuity and circuit integrity. Adjustments shall be made for circuits not complying with testing criteria.
2. Grounding System: Shall be tested by an independent testing laboratory to meet resistance specified in Part 3.1, D.3 of these Specifications. It shall be this Contractor's responsibility to make adjustments, as required, to upgrade non-complying systems to proper and safe operation.
3. All certified testing reports shall be submitted to the Owner at completion of project.

D. Upon completion of all electrical work, this Contractor shall test all circuits, switches, motors, breakers, motor starter(s) and their auxiliary circuits and any other electrical items to insure perfect operation of all electrical equipment.

E. Equipment and parts in need of correction and discovered during such testing shall be immediately repaired or replaced with all new equipment and that part of the system shall then be retested. All such replacement or repair shall be done at no additional cost to the Owner, unless original equipment not provided contractor is determined defective.

F. All circuits shall be tested for continuity and circuit integrity. Adjustments shall be made for circuits not complying with testing criteria.

G. All certified testing reports shall be submitted to the Engineer at completion of project.

1.6 COORDINATION

H. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.

1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

- I. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.
- J. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 8 Section "Access Doors."
- K. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.
- L. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.
- M. Wherever a discrepancy in quantity or size of conduit, wire, equipment, devices, circuit breakers, etc.. (all materials), arises on the Drawing and/or Specifications, the Contractor shall be responsible for providing and installing all material and services required by the strictest condition noted on Drawings and/or in Specifications to insure complete and operable systems as required by the Owner and Engineer.
- N. This Contractor shall examine all Drawings and Specifications in a manner to be fully cognizant of all work required under this Section.
- O. This Contractor shall visit the site and verify existing conditions. Where existing conditions differ from Drawings, adjustment shall be made and allowances included for all necessary equipment to complete all parts of the Drawings and Specifications.
- P. Examine the Drawings and Specifications and determine the work to be performed by the electrical contractor and other trades. Provide the type and amount of electrical materials and equipment necessary to place this work in proper operation, completely wired, tested and ready for use. This shall include all conduit, wire, disconnects, relays, and other devices for the required operation sequence of all electrical, mechanical and other systems or equipment.
- Q. Provide power and control circuits, conduit and wire as indicated on the Mechanical and Plumbing drawings as required for complete and operable systems.

1.7 SHOP DRAWINGS / SUBMITTALS

- A. Drawings shall be submitted in six (6) bound sets accompanied by Letter of Transmittal, which shall give a list of the number and dates of the drawings submitted. Drawings shall be complete in every respect and bound in sets.
- B. The Drawings submitted shall be marked with the name of the project, numbered consecutively and bear the approval of the Contractor as evidence that the Drawings have been checked by the Contractor. Any Drawings submitted without this approval will be returned to the Contractor for resubmission.
- C. If the shop drawings show variations from the requirements of the Contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variations in his letter of transmittal. If the substitution is accepted, the Contractor shall be responsible for proper adjustment which may be caused by the substitution. Samples shall be submitted when requested.

- D. Shop drawings shall be submitted on the following but not limited to:
1. Fire alarm system.
 2. Panelboards.
 3. Switches/Disconnect switches.
 4. Circuit breakers.
 5. Lighting fixtures.
 6. Pullboxes.

1.8 DRAWINGS OF RECORD

- A. The Contractor shall provide and keep up-to-date, a complete record set of blueprints. These shall be corrected daily and show every change from the original Drawings. This set of prints shall be kept on the job site and shall be used only as a record set. This shall not be construed as authorization for the Contractor to make changes in the layout without definite instruction in each case. Upon completion of the work, a set of reproducible Contract Drawings shall be obtained from the General Contractor and all changes as noted on the record set of prints shall be incorporated thereon with black ink in a neat, legible, understandable and professional manner.

1.9 MAINTENANCE, SERVICING, INSTRUCTION MANUALS AND WIRING DIAGRAMS

- A. Prior to final acceptance of the job, the Electrical Contractor shall furnish to the Owner at least four (4) copies of operating and maintenance and servicing instructions, as well as four (4) complete wiring diagrams.
- B. All wiring diagrams shall specifically cover the system supplied. Typical drawings will not be accepted. Two (2) copies shall be presented to the Electrical Engineer and four (4) copies to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials and Equipment: All electrical materials and equipment shall be new and shall be listed by Underwriter's Laboratories and bear their label, or listed and certified by a nationally recognized testing authority where UL does not have an approval. Custom made equipment must have complete test data submitted by the manufacturer attesting to its safety. In addition, the materials and equipment shall comply with the requirements of the following:
1. American Society of Testing Materials (ASTM).
 2. Insulated Cable Engineers Association (ICEA).
 3. National Electrical Manufacturer's Association (NEMA).
 4. National Fire Protection Association (NFPA).
 5. American National Standard Institute (ANSI).

2.2 WIRING DEVICES AND MISCELLANEOUS EQUIPMENT

- A. Fire alarm terminal blocks: Flat mount terminal blocks mounted on plywood backing inside terminal cabinets for conductor termination. Provide quantity of terminal blocks for each system as required. Terminal blocks shall be Kulka standard 600-600A series as manufactured by Marathon Special Products.

- B. Receptacles and plates:
 - A. Furnish and install 20a, 125 volt, 3 wire grounding type duplex receptacles at all receptacle outlets as indicated on drawings, specification grade Leviton, Bryant, Pass and Seymour, or approved equal.
 - B. All receptacle plates shall be stainless steel. Provide outlet boxes for receptacles as specified herein.
 - C. Device color to be ivory in light colored walls and brown in dark colored walls.
- C. Local switches and plates:
 - A. Furnish and install flush tumbler type switches, quiet type 120/277V AC only controlling wall and ceiling outlets as indicated on the drawings. All switches shall be specification grade Leviton, Bryant, Pass and Seymour or approved equal and have ampere rating of not less than 20A.
 - B. Switch plates shall match receptacle plates.
 - C. Where two or more switches are shown in proximity they shall be ganged in the same box and set under a single switch plate.
 - D. Special receptacles or switches shall be as noted on drawings.
 - E. Device color to be ivory in light colored walls and brown in dark colored walls.
- D. Over current devices:
 - A. Circuit breakers shall be operated by a toggle-type handle and shall have a quick-made, quick-break over-center switching mechanism that is mechanically trip free.
 - B. Automatic tripping of the breaker shall be clearly indicated by handle position.
 - C. Contacts shall be non-welding silver alloy and arc extinction shall be accomplished by means of de-ion arc chutes.
 - D. Contractor shall field verify and match existing equipment manufacturer and I.C. ratings.

2.3 LIGHTING FIXTURES:

- A. The Contractor shall furnish and install all lighting fixtures and lamps as indicated on the drawings and in accordance with these specifications.
- B. The Contractor shall be held responsible for the complete equipment of all fixture outlets with fixtures of the proper design as shown.
- C. All new fixtures shall be securely anchored to prevent any possible chance of their falling.
- D. Continuous runs of fixtures shall be installed straight and true.
- E. Recessed fixtures shall be complete with plaster frames, supporting brackets and hanger wires.
- F. The Contractor shall coordinate outlets with the acoustic tile contractor and other trades and locate outlets in center or at intersections of acoustical tile in all acoustic tile ceilings. All fixtures must be kept 1 1/2" clear of all acoustic tile and any combustible material by use of approved spacers, unless Fire Underwriters approved to be surface mounted.
- G. Unless otherwise specified, all fluorescent ballasts shall be classified as the "A" level in the G.E. Ballast sound rating standard. Acceptable manufacturers are Universal, Advance, G.E. or equal. Fluorescent ballasts shall be Advance "ELECTRONIC" Solid State Electronic with reduced harmonics or equal. All fluorescent lamps shall be T8 type with color temperature of

4100K and a C.R.I. of at least 80, Sylvania, Phillips, G.E. or equal. All filament lamps shall be G.E., 120 volts inside frosted, unless otherwise specified. Ballasts for HID and compact fluorescent light fixtures shall be high power factor regulated type.

- H. Before submitting a proposal, each bidder shall determine that all fixtures will perform satisfactorily in the application shown on the plans. (This includes operation of the "P" rated ballasts. There shall be no nuisance tripping of its thermal element.) By the act of submitting a proposal, each bidder shall be deemed to have made such determination and it will be assumed that he is familiar with, accepts and has based his proposal on all existing conditions and limitations applying to the work.
- I. Recessed fixtures in T-Bar ceilings shall be attached to T-Bar with sheet metal screws, minimum of two at each end of each fixture. Attachment to comply with State requirements.
- J. Where fluorescent fixtures are equipped with integral emergency battery packs, the fixtures shall be wired such that all lamps switch on and off via the room light switch, yet the designated emergency lamps automatically energize if the wall switch is in the "on" position and normal power fails.

2.4 SUPPORTING DEVICES

- A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.
- B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.
- C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9 1/16-inch diameter slotted holes at a maximum of 2 inches o.c., in webs.
- D. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring- steel clamps or click-type hangers.
- E. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
- F. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.
- G. Expansion Anchors: Carbon-steel wedge or sleeve type.
- H. Toggle Bolts: All-steel spring head type.
- I. Powder-Driven Threaded Studs: Heat-treated steel.

2.5 ELECTRICAL IDENTIFICATION

- A. Identification Devices: A single type of identification product for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.
- B. Raceway and Cable Labels: Comply with ANSI A13.1, Table 3, for minimum size of letters

for legend and minimum length of color field for each raceway and cable size.

1. Type: Pretensioned, wraparound plastic sleeves. Flexible, preprinted, color-coded, acrylic band sized to suit the diameter of the item it identifies.
 2. Type: Preprinted, flexible, self-adhesive, vinyl. Legend is over-laminated with a clear, weather- and chemical-resistant coating.
 3. Color: Black letters on orange background.
 4. Legend: Indicates voltage.
- C. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape, not less than 1 inch wide by 3 mils thick.
- D. Underground Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape with the following features:
1. Not less than 6 inches wide by 4 mils thick.
 2. Compounded for permanent direct-burial service.
 3. Embedded continuous metallic strip or core.
 4. Printed legend that indicates type of underground line.
- E. Tape Markers for Wire: Vinyl or vinyl-cloth., self-adhesive, wraparound type with preprinted numbers and letters.
- F. Color-Coding Cable Ties: Type 6/6 nylon, self-locking type. Colors to suit coding scheme.
- G. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch minimum thickness for signs up to 20 sq. in. and 1/8-inch minimum thickness for larger sizes. Engraved legend in black letters on white background.
- H. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

2.6 CONCRETE BASES

- I. Concrete Forms and Reinforcement Materials: As specified in Division 3 Section "Cast-in-Place Concrete".
- J. Concrete: 3000-psi, 28-day compressive strength as specified in Division 3 Section "Cast-in-Place Concrete".

2.7 TOUCH-UP PAINT

- A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
- B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.

- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 ELECTRICAL SUPPORTING DEVICE APPLICATION

- A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U- channel system components.
- B. Dry Locations: Steel materials.
- C. Selection of Supports: Comply with manufacturer's written instructions.
- D. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb design load.

3.3 SUPPORT INSTALLATION

- A. Install support devices to securely and permanently fasten and support electrical components.
- B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
- C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
- D. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
- E. Install 1/4-inch- diameter or larger threaded steel hanger rods, unless otherwise indicated.
- F. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
- G. Simultaneously install vertical conductor supports with conductors.
- H. Install metal channel racks for mounting cabinets, disconnect switches, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.
- I. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:
 - 1. New Concrete: Concrete inserts with machine screws and bolts.
 - 2. Steel: Welded threaded studs or spring-tension clamps on steel.
 - a. Field Welding - Comply with AWS D1.1.
 - 3. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
 - 4. Light Steel: Sheet-metal screws.

5. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.4 IDENTIFICATION MATERIALS AND DEVICES

- A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.
- C. Self-Adhesive Identification Products: Clean surfaces before applying.
- D. Identify raceways and cables with color banding as follows:
 1. Bands: Pretensioned, snap-around, colored plastic sleeves or colored adhesive marking tape. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
 2. Band Locations: At changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
 3. Colors: As follows:
 - a. Fire Alarm System: Red.
 - b. Security System: Blue and yellow.
 - c. Telecommunication System: Green and yellow.
- E. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.
- F. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches, overall, use a single line marker.
- G. Color-code 208/120-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:
 1. Phase A: Black,
 2. Phase B: Red.
 3. Phase C: Blue.
 4. Neutral: White.
 5. Ground: Green.
- H. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed 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 are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

3.5 FIRESTOPPING

- A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials and installation requirements are specified in Division 7 Section "Firestopping."

3.6 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger, in both directions, than supported unit. Follow supported equipment manufacturers anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated. Use 3000-psi , 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

3.7 DEMOLITION

- A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.
- B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.
- C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.
- D. Remove demolished material from Project site.
- E. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

3.8 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.9 FIELD QUALITY CONTROL

- A. Inspect installed components for damage and faulty work, including the following:
 - 1. Raceways.
 - 2. Building wire and connectors.
 - 3. Supporting devices for electrical components.
 - 4. Electrical identification.
 - 5. Concrete bases.
 - 6. Electrical demolition.
 - 7. Cutting and patching for electrical construction.
 - 8. Touch-up painting.

3.10 REFINISHING AND TOUCH-UP PAINTING

- A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 9 Section "Painting."
 - 1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
 - 2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
 - 3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.11 CLEANING AND PROTECTION

- A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
- B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 16060

GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- B. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.
- C. Related Sections include the following:
 - 1. Section: 16120 - Conductors And Cables.

1.3 SUBMITTALS

- D. Procedures: In Accordance with Section 01300.
- E. Product Data: For each type of product indicated.
- F. Product Data: For the following:
 - 1. Ground rods.
- G. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- H. Field Test Reports: Submit written test reports to include the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.4 QUALITY ASSURANCE

- I. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7 or a member company of the InterNational Electrical Testing Association and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association to supervise on-site testing specified in Part 3.
- J. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for

intended use.

1. Comply with UL 467.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- K. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Grounding Conductors, Cables, Connectors, and Rods:
 - a. Apache Grounding/Erico Inc.
 - b. Boggs, Inc.
 - c. Chance/Hubbell.
 - d. Copperweld Corp.
 - e. Erico Inc.; Electrical Products Group.
 - f. Galvan Industries, Inc.
 - g. Harger Lightning Protection, Inc.
 - h. Hastings Fiber Glass Products, Inc.
 - i. Ideal Industries, Inc.
 - j. ILSCO.
 - k. Kearney/Cooper Power Systems.
 - l. O-Z/Gedney Co.; a business of the EGS Electrical Group.
 - m. Raco, Inc.; Division of Hubbell.
 - n. Thomas & Betts, Electrical.

2.2 GROUNDING CONDUCTORS

- L. For insulated conductors, comply with Division 16 Section "Conductors and Cables."
- M. Material: Copper.
- N. Equipment Grounding Conductors: Insulated with green-colored insulation.
- O. Grounding Electrode Conductors: Stranded cable.
- P. Underground Conductors: Bare, tinned, stranded, unless otherwise indicated.
- Q. Bare Copper Conductors: Comply with the following:
 1. Solid Conductors: ASTM B 3.
 2. Assembly of Stranded Conductors: ASTM B 8.
 3. Tinned Conductors: ASTM B 33.
- R. Copper Bonding Conductors: As follows:
 1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch in diameter.
 2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.
 3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16-inch thick.

4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8- inches wide and 1/16-inch thick.

2.3 CONNECTOR PRODUCTS

- S. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.
- T. Bolted Connectors: Bolted-pressure-type connectors, or compression type.
- U. Welded Connectors: Exothermic-welded type, in kit form, and selected per manufacturer's written instructions.

2.4 GROUNDING ELECTRODES

- V. Ground Rods: Copper-clad.
- W. Test Wells: Provide hand holes as specified in Division 2 Section "Underground Ducts and Utility Structures "

PART 3 - EXECUTION

3.1 APPLICATION

- X. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.
- Y. In raceways, use insulated equipment grounding conductors.
- Z. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections, except those at test wells.
- AA. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.
- BB. Ground Rod Clamps at Test Wells: Use bolted pressure clamps with at least two bolts.

3.2 EQUIPMENT GROUNDING CONDUCTORS

- A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.
- B. Install equipment grounding conductors in all feeders and circuits.
- C. Install insulated equipment grounding conductor with circuit conductors for the following items, in addition to those required by CEC:
 1. Feeders circuits.
 2. Flexible raceway runs.

- D. Nonmetallic Raceways: Install an equipment grounding conductor in nonmetallic raceways unless they are designated for telephone or data cables.

3.3 CONNECTIONS

- A. General: Make connections so galvanic action or electrolysis possibility is minimized.
- B. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.
 - 3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 - 4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
 - 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- C. Exothermic-Welded Connections: Comply with manufacturer's written instructions. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.
- D. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.
- E. Non-contact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.
- F. Connections at Test Wells: Use compression-type connectors on conductors and make bolted-and clamped-type connections between conductors and ground rods.
- G. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- H. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.
- I. Moisture Protection: If insulated grounding conductors are connected to ground rods or grounding buses, insulate entire area of connection and seal against moisture penetration of

insulation and cable.

3.4 FIELD QUALITY CONTROL

- A. Testing: Engage a qualified testing person to perform the following field quality- control testing:
- B. Testing: Perform the following field quality-control testing:
 - 1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.
 - 2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Measure ground resistance not less than two full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests, by the fail-of-potential method according to IEEE 81.
 - 3. Provide drawings locating each ground rod and ground rod assembly and other grounding electrodes, identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
 - a. Equipment Rated 500 kVA and Less: 10 ohms.
 - 4. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

3.5 GRADING AND PLANTING

- A. Restore surface features, including vegetation, at areas disturbed by Work of this Section. Reestablish original grades, unless otherwise indicated. If sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other activities to their original condition. Include application of topsoil, fertilizer, lime, seed, sod, sprig, and mulch. Comply with Division 2 Section "Landscaping." Maintain restored surfaces. Restore disturbed paving as indicated.

END OF SECTION

SECTION 16120

CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.
- B. Related Sections:
 - 1. Section: 16050 — Basic Electrical Materials And Methods.
- C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.3 SUBMITTALS

- A. Procedures: In accordance with Section 01300.
- B. Product Data: For Conductors and Cables.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: In addition to requirements specified in Division 1 Section "Quality Control," an independent testing agency shall meet OSHA criteria for accreditation of testing laboratories, Title 29, Part 1907; or shall be a full-member company of the InterNational Electrical Testing Association.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies, to supervise on-site testing specified in Part 3.
- B. Listing and Labeling: Provide wires and cables specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.
- C. Comply with NFPA 70,

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wires and cables according to NEMA WC 26.

1.6 COORDINATION

- A. Coordinate layout and installation of cables with other installations.
- B. Revise locations and elevations from those indicated, as required to suit field conditions and as approved by Architect.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Wires and Cables:
 - a. Alcan Aluminum Corporation; Alcan Cable Div.
 - b. American Insulated Wire Corp.; Leviton Manufacturing. Co.
 - c. BICC Brand-Rex Company.
 - d. Carol Cable Co., Inc.
 - e. Senator Wire & Cable Company.
 - f. Southwire Company.
 - 2. Connectors for Wires and Cables:
 - a. AMP Incorporated.
 - b. General Signal; O-Z/Gedney Unit
 - c. Monogram Co.; AFC.
 - d. Square D Co.; Anderson.
 - e. 3M Company; Electrical Products Division.

2.2 WIRES AND CABLES

- A. UL-listed building wires and cables with conductor material, insulation type, cable construction, and rating as specified in Part 3 "Wire and Insulation Applications" Article.
- B. Rubber Insulation Material: Comply with NEMA WC 3.
- C. Thermoplastic Insulation Material: Comply with NEMA WC 3.
- D. Cross-Linked Polyethylene Insulation Material: Comply with NEMA WC 7.
- E. Ethylene Propylene Rubber Insulation Material: Comply with NEMA WC 8.
- F. Conductor Material: Copper.
- G. Stranding: Solid conductor for No. 10 AWG and smaller; stranded conductor for larger than No. 10 AWG.

2.3 CONNECTORS AND SPLICES

- A. UL-listed, factory-fabricated wiring connectors of size, capacity rating, material, type, and

class for application and service indicated. Comply with Project's installation requirements and as specified in Part 3 "Wire and Insulation Applications" Article.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine raceways and building finishes to receive wires and cables for compliance with requirements for installation tolerances and other conditions affecting performance of wires and cables. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 WIRE AND INSULATION APPLICATIONS

- A. Feeders: Type THHN/THWN, in raceway.
- B. Branch Circuits: Type THHN/THWN, in raceway.
- C. Fire Alarm Circuits: #10 or larger, type THHN/THWN; 'FN' cable shall be West Penn #AQ227, 12/2 stranded fire alarm cable; and 'FI' cable shall be West Penn #AQ293, 18/2 stranded fire alarm cable, , in raceway.
- D. Class 1 Control Circuits: Type THHN/THWN, in raceway.

3.3 INSTALLATION

- A. Install wires and cables as indicated, according to manufacturer's written instructions and NECA's "Standard of Installation."
- B. Remove existing wires from raceway before pulling in new wires and cables.
- C. Pull Conductors: Use manufacturer-approved pulling compound or lubricant where necessary: compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables, parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Division 16 Section "Basic Electrical Materials and Methods."
- G. Seal around cables penetrating fire-rated elements according to Division 7 Section "Firestopping."
- H. Identify wires and cables according to Division 16 Section "Basic Electrical Materials and

Methods”.

3.4 CONNECTIONS

- A. Conductor Splices: Keep to minimum.
- B. Install splices and tapes that possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.
- C. Use splice and tap connectors compatible with conductor material.
- D. Use oxide inhibitor in each splice and tap connector for aluminum conductors.
- E. Wiring at Outlets: Install conductor at each outlet, with at least 12-inches of slack.
- F. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer.
- G. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL

- H. Testing Agency: Engage a qualified independent testing agency to perform field quality-control testing.
- I. Testing: On installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
 - 1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.
 - 2. Correct malfunctioning conductors and cables at Project site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

END OF SECTION

SECTION 16130

RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
 - 1. Raceways include the following:
 - a. RMC.
 - b. IMC.
 - c. EMT.
 - d. FMC.
 - e. LFMC.
 - 2. Boxes, enclosures, and cabinets include the following:
 - a. Device boxes.
 - a. Outlet boxes.
 - b. Full and junction boxes.
 - c. Cabinets and hinged-cover enclosures.
- A. Related Sections include the following:
 - 1. Division 7 Section "Firestopping."
 - 2. Division 16 Section "Basic Electrical Materials and Methods" for raceways and box supports.
 - 3. Division 16 Section "Wiring Devices" for devices installed in boxes.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical non-metallic tubing.
- C. FMC: Flexible metal conduit.
- D. IMC: Intermediate metal conduit.
- E. LFMC: Liquid-tight flexible metal conduit.
- F. RMC: Rigid metal conduit.

1.4 SUBMITTALS

- A. Procedures: In accordance with Section 01300.
- B. Product Data: For surface raceways, wireways and fittings, hinged-cover enclosures and cabinets provided new.
- C. Shop Drawings: Include layout drawings showing components and wiring for nonstandard boxes, enclosures and cabinets.

1.5 QUALITY ASSURANCE

- A. Listing and Labeling: Provide raceways and boxes specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7
- B. Comply with NFPA 70.

1.6 COORDINATION

- A. Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Metal Conduit and Tubing:
 - a. Alflec Corp.
 - b. Anamet, Inc.; Anaconda Metal Hose.
 - c. Anixter Brothers, Inc.
 - d. Carol Cable Co., Inc.
 - e. Grinnell Co.; Allied Tube and Conduit Div.
 - f. Monogram Co.; AFC.
 - g. Triangle PWC, Inc.
 - h. Wheatland Tube Co.
 - 2. Non-metallic Conduit and Tubing:
 - a. Anamet, Inc.; Anaconda Metal Hose.
 - b. Hubbel, Inc.; Raco, Inc.
 - c. Lamson & Sessions; Carlon Electrical Products.
 - d. Thomas & Betts Corp.
 - 3. Conduit Bodies and Fittings:
 - a. Crouse-Hinds; Div. of Cooper Industries.
 - b. Emerson Electric Co.; Appleton Electric Co.
 - c. Hubbell, Inc.; Killark Electric Manufacturing Co.
 - d. Lamson & Sessions; Carlon Electrical Products.

- e. O-Z/Gedney; Unit of General Signal.
 - f. Scott Fetzer Co.; Adalet-PLM.
4. Boxes, Enclosures, and Cabinets:
- a. Butler Manufacturing Co.; Walker Division.
 - a. Crouse-Hinds; Div. of Cooper Industries.
 - b. Hoffman Engineering Co.; Federal-Hoffman, Inc.
 - c. Hubbell Inc.; Killark Electric Manufacturing Co.
 - d. Hubbell Inc.; Raco, Ind.
 - a. Lamson & Sessions; Carlon Electrical Products.
 - b. O-Z/Gedney; Unit of General Signal.
 - c. Robroy Industries, Inc.; Electrical Division.
 - d. Scott Fetzer Co.; Adalet-PLM.
 - e. Thomas & Betts Corp.
 - f. Woodhead Industries, Inc.; Daniel Woodhead Co.

2.2 METAL CONDUIT AND TUBING

- A. Rigid Steel Conduit: ANSI C80.1.
- B. IMC: ANSI C80.6.
- C. EMT and Fittings: ANSI C80.3.
 - 1. Fittings: Compression type.
- D. FMC: Zinc-coated steel.
- E. LFMC: Flexible steel conduit with PVC jacket.
 - 1. Fittings: NEMA FB 1; compatible with conduit/tubing materials.

2.3 NONMETALLIC CONDUIT AND TUBING

- A. RNC: NEMA TC 2, Schedule 40 or SO PVC.
- B. RNC Fittings: NEMA TC 3; match to conduit or conduit/tubing type and material.

2.4 OUTLET AND DEVICE BOXES

- A. Sheet Metal Boxes: NEMA OS 1.
- B. Cast-Metal Boxes: NEMA FB I, Type FD, cast box with gasketed cover.

2.5 PULL AND JUNCTION BOXES

- A. Small Sheet Metal Boxes: NEMA OS 1.
- B. Cast-Metal Boxes: NEMA FB 1, cast aluminum with gasketed cover.

2.6 ENCLOSURES AND CABINETS

- A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- B. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 3R with continuous-hinge cover with flush latch unless otherwise indicated.
- C. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
- D. Cabinets: NEMA 250, Type 3R, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel, Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards, Include metal barriers to separate wiring of different systems and voltage, and include accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of raceway installation, Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2. WIRING METHODS

- B. Outdoors: Use the following wiring methods:
 1. Exposed: Rigid steel
 2. Concealed: Rigid steel
 3. Underground, Single Run: RNC.
 4. Underground, Grouped: RNC.
 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 6. Boxes and Enclosures: NEMA 250, Type 3R or Type 4.
- C. Indoors: Use the following wiring methods:
 1. Exposed: EMT
 2. Concealed: EMT
 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except in wet or damp locations, use LFMC.
 4. Damp or Wet Locations: Rigid steel conduit.
 5. Exposed under 15' or exposed to physical damage: Rigid Steel Conduit.
 6. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
 - a. Damp or Wet Locations: NEMA 250, Type 3R.
 7. Concealed: interior Lighting systems only. MC Cable, J-box to light and light to light only. All homeruns shall EMT.

3.3 INSTALLATION

- A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's

written instructions.

- B. Minimum Raceway Size: 3/4-inch trade size.
- C. Conceal conduit and EMT, unless otherwise indicated, within finished walls, ceilings, and floors.
- D. Keep raceways at least 6-inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- E. Install raceways level and square and at proper elevations. Provide adequate headroom.
- F. Complete raceway installation before starting conductor installation.
- G. Support raceways as specified in Division 16 Section "Basic Electrical Materials and Methods."
- H. Use temporary closures to prevent foreign matter from entering raceways.
- I. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.
- J. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.
- K. Use raceway fittings compatible with raceways and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, unless otherwise indicated.
- L. Run concealed raceways, with a minimum of bends, in the shortest practical distance considering the type of building construction and obstructions, unless otherwise indicated.
- M. Raceways Embedded in Slabs: Install in middle third of slab thickness where practical, an leave at least 1-inch concrete cover.
 - 1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
 - 2. Space raceways laterally to prevent voids in concrete.
 - 3. Run conduit larger than 1-inch trade size parallel to or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 - 4. Transition from nonmetallic tubing to Schedule 80 nonmetallic conduit, rigid steel conduit, or IMC before rising above floor.
- N. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.
 - 1. Run parallel or banked raceways together, on common supports where practical.
 - 2. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

- O. Join raceways with fittings designed and approved for the purpose and make joints tight.
 - 1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
 - 2. Use insulating bushings to protect conductors.
- P. Tighten set screws of threadless fittings with suitable tools.
- Q. Terminations: Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against the box. Where terminations are not secure with 1 locknut, use 2 locknuts: 1 inside and 1 outside the box.
- R. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.
- S. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of the pull wire.
- T. Telephone and Signal System Raceways, 2-Inch Trade Size and Smaller: In addition to the above requirements, install raceways in maximum lengths of 150 feet and with a maximum of three 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements.
- U. Install raceway sealing fittings according to manufacturer's written instructions. Locate fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
 - 1. Where conduits pass from warm to cold locations, such as the boundaries of refrigerated spaces.
 - 2. Where otherwise required by NFPA 70.
- V. Flexible Connections: Use maximum of 6 feet of flexible conduit for recessed and semi-recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquid-tight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.
- W. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying the raceways to receptacle or fixture ground terminals.
- X. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

3.4 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
 - 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare

trench bottom as specified in Division 2 Section "Earthwork" for pipe less than 6 inches in nominal diameter.

2. Install backfill as specified in Division 2 Section "Earthwork."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 2 Section "Earthwork."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
6. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits but a minimum of 6 inches below grade. Align planks along centerline of conduit.
7. Underground Warning Tape: Comply with requirements in Division 16 Section "Electrical Identification."

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 16 Section "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Division 7 Section "Through-Penetration Firestop Systems."

3.7 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure coatings, finishes, and cabinets are without damage or deterioration at the time of Substantial Completion.
 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 2. Repair damage to PVC or paint finishes with matching touchup coating

recommended by manufacturer.

3.8 CLEANING

- A. On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

END OF SECTION

SECTION 16400

SERVICE AND DISTRIBUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- B. This Section includes overcurrent devices and panelboards.
- C. Related Sections include the following:
 - 1. Section: 16050 - Basic Electrical Materials And Methods.
 - 2. Section: 16060 - Grounding And Bonding.
 - 3. Section: 16120 - Conductors And Cables

1.3 SUBMITTALS

- D. Procedures: In Accordance with Section 01300.
- E. Product Data: For each type of product indicated.
- F. Product Data: For the following:
 - 1. Panelboards.
 - 2. Circuit breakers with descriptive data and time-current curves.
- G. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- H. Field Test Reports: Submit written test reports to include the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Testing agency as defined by OSHA in 29 CFR 1910.7 or a member company of the InterNational Electrical Testing Association and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association to supervise on-site testing specified in Part 3.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70,

Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1. Comply with UL 467.

PART 2 - PRODUCTS

2.1 OVERCURRENT DEVICES:

- A. Main protective device shall be circuit breaker with interrupting rating, frame and trip ratings as shown on the drawings.
- B. Feeder protective devices as shown shall be molded case circuit breakers providing complete circuit overcurrent protection by having inverse time and instantaneous tripping characteristics, and where applicable, be current limiting.
- C. Circuit breakers shall be operated by a toggle-type handle and shall have a quick-made, quick-break over-center switching mechanism that is mechanically trip free. Automatic tripping of the breaker shall be clearly indicated by handle position. Contacts shall be non-welding silver alloy and arc extinction shall be accomplished by means of DE-ION arc chutes.
- D. Circuit breaker interrupting capacities shall be as indicated on the drawings or as specified hereinafter. Where applicable, circuit breakers shall be listed for series application.
- E. Standard two and three pole circuit breakers shall be UL listed as HACR type breakers for use with heating, ventilating and air conditioning equipment.
- F. All circuit breakers located in separate enclosures, whether Nema 1 or Nema 3R rated, shall include a handle padlock attachment.
- G. All circuit breakers, 100 amps or more, shall be tested by an independent testing firm in accordance with NETA specifications and a report submitted to the architect. The Contractor shall pay for the cost of this requirement. Any circuit breaker that does not pass the test shall be replaced.

2.2 PANEL BOARDS

- A. The panel boards shall be constructed in accordance with the standard set up by the Underwriters' Laboratories, Inc., and as manufactured by Square "D", or approved equal, and each shall contain the number and type of circuit breakers as indicated on the drawings.
- B. The panel boards shall be equipped with hinged doors, flat front, typewritten circuit directories. All finish in offices, corridors or areas subject to public view shall be prime coat for finish coat by painter. In storage rooms, equipment rooms, etc., finish shall be standard factory gray Hammertone. Provide lock on all panels. Key as directed by Architect.
- C. Main Overcurrent Protective Devices: Circuit breaker. When shown on the drawings, panel boards shall be provided with an integral main circuit breaker complying with overcurrent

device section of this specification, sized as indicated on the drawings.

- D. The panel boards shall be equipped with branch distribution circuit breakers per the overcurrent section of this specification. Branch overcurrent protective devices shall be one of the following:
 - 1. For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
 - 2. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.

2.3 MOTOR DISCONNECTS

- A. Shall be fused switch with dual element fuses. Heavy Duty rated and quick-make quick-break type. Fuse rating shall comply with motor manufacturer's recommendations. Switch shall be U.L. listed. Disconnects shall have an external operating handle, lockable in the open or closed position.
- B. Provide disconnects for all motors if not provided by others.
- C. Disconnect switches shall be located so as not to obscure any part of the HVAC unit's nameplate data.
- D. Disconnects shall be heavy duty rated. Operating handle shall be lockable in open or closed position.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each panel board and transformer.
- B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install panel boards and accessories according to NEMA PB 1.1.
 - 1. Mounting: Plumb and rigid without distortion of box.
 - 2. Circuit Directory: Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
 - 3. Install filler plates in unused spaces.
 - 4. Wiring in panel board Gutters: Arrange conductors into groups and bundle and wrap with wire ties after completing load balancing.

- B. Install disconnect switches and circuit breakers in locations as indicated, according to manufacturer's written instructions.
 - 1. Install disconnect switches and circuit breakers level and plumb.
 - 2. Install wiring between disconnect switches, circuit breakers, control, and indication devices.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Basic Electrical Materials and Methods."
- B. Nameplates: Label each disconnect switch, circuit breaker and panel board with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.4 CONNECTIONS

- A. Ground equipment according to Division 16 Section "Grounding and Bonding."
- B. Install equipment grounding connections for panel boards with ground continuity to main electrical ground bus.
- C. Connect wiring according to Division 16 Section "Conductors and Cables."
- D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.5 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- B. Testing Agency: Engage a qualified independent testing agency to perform specified testing.
- C. Testing: After installing panel boards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
 - 1. Procedures: Perform each visual and mechanical inspection and electrical test indicated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Balancing Loads: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes as follows:
 - 1. Measure as directed during period of normal system loading.
 - 2. Perform load-balancing circuit changes outside normal occupancy/working schedule

of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data-processing, computing, transmitting, and receiving equipment.

3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
4. Tolerance: Difference exceeding 20 percent between phase loads, within a panel board, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.6 ADJUSTING

- A. Set field-adjustable switches and circuit-breaker trip ranges.

3.7 CLEANING

- A. On completion of installation, inspect interior and exterior of panel boards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION

