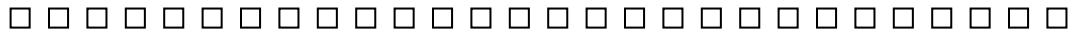


Project Manual



GOLF CART STORAGE BUILDING

for:

TAFT UNION HIGH SCHOOL

Project #

2436

Set #



TAFT UNION HIGH SCHOOL DISTRICT

**GOLF CART STORAGE BUILDING
701 WILDCAT WAY, TAFT, CA 93268**

DISTRICT

Taft Union High School District
701 Wildcat Way
Taft, CA 93268

PROJECT DOCUMENTS PREPARED BY:

ARCHITECT

Ordiz-Melby Architects, Inc.
5500 Ming Avenue, Suite 280
Bakersfield, CA 93309



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END OF INDEX 00 01 10

01-NOTICE TO CONTRACTORS CALLING FOR BIDS

Owner: Taft Union High School District
701 Wildcat Way
Taft, California 93268
Phone: (661) 763-2300

Bid Deadline: 2:00 p.m. of the
January 7, 2026

Place of Bid Receipt: Ordiz Melby Architects
5500 Ming Avenue Suite 280
Bakersfield, CA 93309

Project Identification Name: Golf Cart Storage Building

Project Description: **EXISTING GOLF CART STORAGE:**
Tenant improvement of existing 2,280 sf Golf
cart storage building.

NEW GOLF CART STORAGE:
New construction of a 2,280 sf Golf cart
storage building and related infrastructure
upgrades.

Plans Available from: Ordiz-Melby Architects
5500 Ming Ave., Suite 280
Bakersfield, CA 93309
Phone: (661) 832-5258
Contact: Anahi Mellin
Email: amellin@ordizmelby.com

Pre-Bid Mandatory Job Walk: 10:00am December 17th 2025 at the Admin bldg.

The lowest bid shall be the lowest bid price on the base contract without consideration of the prices on additive or deductive items.

The OWNER named above will receive sealed bids for the award of a contract for the identified project up to, but not later than the specified deadline. Bids received by the deadline shall be opened and publicly read aloud at the time and place indicated.

Each bid must conform and be responsive to the contract documents.

Each bid must be accompanied by the security referred to in the contract documents and a list of proposed subcontractors.

The OWNER reserves the right to reject any or all bids and/or waive any irregularities or informalities in any bids or in the bidding process.

The schedule of per diem wages is based upon a working day of eight hours. The rate for holiday and overtime work shall be at least time and one half.

It shall be mandatory upon the contractor to whom the contract is awarded (CONTRACTOR), and upon any subcontractor under him, to pay not less than the specified rates to all workers employed by them in the execution of the contract. It is CONTRACTOR'S responsibility to determine any rate change which may have or will occur during the intervening period between each issuance of written rates by the Director of Industrial Relations.

No bidder may withdraw his bid for a period of **sixty (60)** days after the date set for the opening of bids.

A payment bond and a performance bond will be required prior to execution of the contract. The payment shall be in the 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 the OWNER to ensure his performance under the contract. At the request and expense of the 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 61430, 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 essentially similar to the one indicated in the General Conditions.

To perform the work required by this Notice, CONTRACTOR must possess the following type of contractor's license:

Class 'B' General Building

Publish dates: XX/XX/2025

02 CONSTRUCTION AGREEMENT

PART 1 GENERAL INFORMATION

- A. The Agreement for this Contract is the American Institute of Architects Document A101-2007,"Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum", 2007 Edition, herein referred to as the "Agreement".
- B. The Work shall be commenced on or before the **xxxx ()** day after receiving the OWNER'S Notice to Proceed and shall be completed within **One Hundred Twenty One (121)** consecutive calendar days from the specified in the Notice to Proceed.
- C. Time is of the essence. If the Work is not completed in accordance with the time stipulated it is understood that the OWNER will suffer damage. It being impractical and infeasible to determine the amount of actual damage, in accordance with Government Code Section 53069.85, it is agreed that CONTRACTOR shall pay OWNER as fixed and liquidated damages, and not as a penalty, the sum of **One Thousand Dollars (\$1.000.00)** for each calendar day of delay until work is completed and accepted. This amount shall be deducted from any payments due to, or to become due to, CONTRACTOR. CONTRACTOR and CONTRACTOR'S surety shall be liable for the amount thereof. Time extensions may be granted by the OWNER as provided in the General Conditions.

PART 2 PRODUCTS

Not Applicable

PART 3 EXECUTION

Not Applicable

END OF SECTION

03-SUBSTITUTION LISTING

****TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID****

TO: TAFT UNION HIGH SCHOOL DISTRICT ("OWNER")

1. Pursuant to bidding and contract requirements for the work titled:
Project Title/Bid #: GOLF CART STORAGE BUILDING

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.

04-DESIGNATION OF SUBCONTRACTORS

In compliance with the Subletting and Subcontracting Fair Practices Act (Public Contract Code Section 4100 et. seq.) and any amendments thereof, each bidder shall set forth below: (a) the name and the location of the place of business of each subcontractor who will perform work or labor or render service to the bidder (prime contractor) in or about the construction of the work or improvement to be performed under this contract or a subcontractor licensed by the State of California who, under subcontract to the bidder (prime contractor), specially fabricates and 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 (prime contractor's) total bid and (b) the portion of the work which will be done by each subcontractor. The bidder (prime contractor) shall list only one subcontractor for each such portion as is defined by the bidder (prime contractor) in this bid.

If a bidder (prime contractor) fails to specify a subcontractor or if a bidder (prime contractor) 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 (**prime** contractor's) total bid, bidder shall be deemed to have agreed that bidder is fully qualified to perform that portion, and that bidder alone shall perform that portion.

No bidder (prime contractor) whose bid is accepted shall (a) substitute any subcontractor, (b) permit any subcontractor to be voluntarily assigned or transferred or allow it to be performed by any one 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 (prime contractor'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. Subletting or subcontracting of any portion of the work in excess of one-half of one percent of the bidder's (prime contractor's) total bid as to which no subcontractor was designated in the original bid shall only be permitted in cases of public emergency or necessity, only after a finding reduced to writing as a public record of the District awarding this contract setting forth the facts constituting the emergency or necessity.

Note: If alternate bids are called for and bidder intends to use a different or additional subcontractors on the alternates, a separate list of subcontractors must be provided for each such alternate. Identify additional list of subcontractors by Alternate Bid No. (form enclosed)
SUBCONTRACTORS

04-DESIGNATION OF SUBCONTRACTORS

Type of trade, labor, or service	Name & License # of Subcontractor License Expiration Date	Complete Address (Name of City Not Sufficient) and Telephone No.

Dated: _____

Name of Bidder

By: _____

(Signature of Bidder)

Print Name: _____

Address: _____

Telephone: _____

04-DESIGNATION OF SUBCONTRACTORS

ALTERNATE BID NO. _____ (IF APPLICABLE)

Type of trade, labor, or service	Name & License # of Subcontractor License Expiration Date	Complete Address (Name of City Not Sufficient) and Telephone No.

Dated: _____

Name of Bidder:

(Signature of Bidder)

Print Name: _____

Address: _____

Telephone: _____

05 BID FORM

TO: TAFT UNION HIGH SCHOOL DISTRICT

1. Pursuant to and in compliance with your Notice to Contractors Calling for Bids and related documents, the undersigned bidder, having familiarized himself 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:

GOLF CART STORAGE BUILDING Project No.: 2025-2436

All in strict conformity with the drawings and specifications and other contract documents, including addenda nos. ____, ____, ____, ____, and ____, on file at the office of the Ordiz Melby Architects, Inc. for the sum of:

\$ _____

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 **seven (7)** calendar days after the documents are presented for execution.

Attached is a bid security in the amount of not less than **ten (10)** percent of the base bid:

\$ _____

____ bid bond ____ certified check ____ cashier's check

The bidder has carefully examined the plans and specifications for this project prepared and furnished by Owner and acknowledge their sufficiency.

It is understood and agreed that the work under the contract for this bid shall be commenced by the bidder, if awarded the contract, on the date to be stated in the OWNER'S Notice to Proceed.

06-BID BOND

KNOW ALL PERSONS BY THESE PRESENTS, that we _____, as Principal, and _____, Surety, are held and firmly bound unto the **TAFT UNION HIGH SCHOOL DISTRICT**, hereinafter called the OWNER, in the sum of **TEN PERCENT (10%) OF THE TOTAL AMOUNT OF THE BID** of the Principal submitted to the said OWNER for the work 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 _____ day of _____, 20____, for:

GOLF CART STORAGE BUILDING

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 sixty (60) days after said opening; and if the Principal is awarded the contract, and shall within the period specified therefore, or, if no period be specified, within five (5) 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 for labor and materials used for the performance of the contract, then the above obligation shall be void and of no effect, otherwise to remain in full force and effect.

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 seal of each corporate party being hereto affixed and duly signed by its undersigned authorized representative.

(Corporate Seal of
Principal, if Corporation)

Principal (Proper Name of Bidder)

By: _____
Signature

Print Name

Title

(Corporate Seal of Surety)

Surety

By: _____
Signature

Print Name

Title

Address

Telephone No.

I, the below-indicated bidder, declare under penalty of perjury that the information provided and representations made in this bid are true and correct and that this declaration was executed on _____, 20__, at _____, _____ County, California.

NAME OF BIDDER: _____
(Type or Print)

FULL NAME OF
ALL PARTNERS OR
LEGAL NAME OF
CORPORATION: _____
(Type or Print)

BUSINESS
ADDRESS: _____
(Type or Print)

TELEPHONE: _____
(Type or Print)

BY: _____
(Signature in ink)
(Type or print name and title under signature)

PRESIDENT OF
CORPORATION: _____
(Signature in ink)
(Type or print name and title under signature)

SECRETARY OF
CORPORATION: _____
(Signature in ink)
(Type or print name and title under signature)

CALIFORNIA STATE
CONTRACTORS
LICENSE NO.: _____
(Type or Print)

LICENSE

EXPIRATION
DATE:

(Type or Print)

IN THE NAME OF:

(Type or Print)

TYPE OF LICENSE:

(Type or Print)

DATED:

[CORPORATE SEAL]

07 PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS:

TAFT UNION HIGH SCHOOL DISTRICT

WHEREAS, said 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 said

WHEREAS, the **TAFT UNION HIGH SCHOOL DISTRICT** ("hereinafter referred to as Owner"), has awarded to _____, hereinafter referred to as the "Contractor/Principal" a contract for the work described as follows:

GOLF CART STORAGE BUILDING

contract;

NOW, THEREFORE, we, the Contractor/Principal and _____, as Surety, are held firmly bound unto **TAFT UNION HIGH SCHOOL DISTRICT** 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 said 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 herein above set forth, and also will pay in case suit is brought upon this bond, 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.

07 PAYMENT 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 herein above described or pertaining or relating to the furnishing of labor, materials, or equipment therefore, 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 herein above described, 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 herein mentioned.

Any claims under this bond may be addressed to:

(Name and address of Surety)

(Name and address of agent or representative in California, if different from above)

(Telephone number of Surety, or agent or representative in California)

IN WITNESS WHEREOF, we have hereto set our hands and seals on this _____ day of _____, 20____.

Contractor/Principal (Seal)

By: _____
Signature

Print Name and Title

07 PAYMENT BOND

Surety

By:

Signature

Print Name and Title

SEAL AND NOTARIAL
ACKNOWLEDGEMENT
OF SURETY

(Mailing Address and Telephone Number of Surety)

08 FAITHFUL PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, **TAFT UNION HIGH SCHOOL DISTRICT** (hereinafter referred to as "OWNER"), awarded to _____ (hereinafter referred to as the "Contractor/Principal") the contract for the work described as follows:

GOLF CART STORAGE BUILDING

WHEREAS, said Contractor/Principal is required under the terms of said contract to furnish a bond for the faithful performance of said contract which contract is incorporated herein by reference;

NOW, THEREFORE, we the undersigned Contractor, as Principal, and Surety are held and firmly bound to the OWNER in the sum of _____ Dollars (\$_____) (this amount being not less than one hundred percent [100%] of the total amount payable by the OWNER under the terms of the contract awarded by the OWNER to the Contractor/Principal), lawful money of the United States of America, for payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, 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 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 **one (1) year** after the acceptance of the work by 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 **one (1) year** 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 hereunder shall continue so long as any obligation of Contractor remains.

08 FAITHFUL PERFORMANCE BOND

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 thereunder, 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 hereunder, 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 thereto, 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 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's/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, the said Surety, for value received, hereby stipulates and agrees that no change, extension of time, alternation or modification of the Project documents, or of the work to be performed thereunder, 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 Project documents or of work to be performed thereunder.

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.

08 FAITHFUL PERFORMANCE BOND

IN WITNESS WHEREOF, we have hereto set our hands and seals on this _____ day of _____, 20____.

Contractor/Principal (Seal)

By: _____

Signature

Print Name and Title

Surety

By: _____

Signature

Print Name and Title

SEAL AND NOTARIAL
ACKNOWLEDGEMENT
OF SURETY

(Mailing Address and Telephone Number of Surety)

**SUMMARY OF WORK
SECTION 01 11 00**

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1
 - 2. Owner Furnished Products
 - 3. Future Work
 - 4. Owner Occupancy
 - 5. Base Bid Scope of Work.

1.02 OWNER OCCUPANCY

- A. Partial Occupancy:
 - 1. Owner reserves the right to occupy, place and install equipment as necessary in substantially completed buildings. Cooperate with Owner to minimize conflict and facilitate Owner's operations.
- B. Acceptance of Work:
 - 1. Partial occupancy does not constitute acceptance of work. Refer to General Conditions, Article 53 – Contract Closeout and Article 54 – Completion.

1.04 BASE BID SCOPE OF WORK

- A. The "Project", of which the "Work" of this contract is a part, is titled "Golf Cart Storage Building".
- B. The "Work" of this contract is defined by the Contract Documents and is defined to include all site improvements, utilities, and construction for:

EXISTING GOLF CART STORAGE:

Tenant improvement of existing 2,280 sf Golf cart storage building.

NEW GOLF CART STORAGE:

New construction of a 2,280 sf Golf cart storage building and related infrastructure upgrades.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 11 00

**UNIT COSTS
SECTION 01 22 00**

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1
 - 2. Unit costs.
 - 3. Submission procedures.
 - 4. Documentation of changes to Contract Sum and Contract Time.
- B. Related Sections:
 - 1. Drawings and general provisions of Contract, including General and Supplementary Conditions, and Division 0 and Division 1 Specification Sections apply to work of this Section.
 - 2. Section 01 11 00: Summary of Work
 - a. This section describes work to be included in the base bid.

1.02 SUBMITTALS

- A. Unit Costs described in this Section are required to be reflected in the bid submitted on the Bid Form for this work.
- B. Do not submit unit costs, other than described in this Section, except as provided for under the General and Supplementary Conditions of the Contract.

1.03 MODIFICATIONS

- A. Should the Owner elect to proceed on the basis of one or more of the Unit Costs, CONTRACTOR shall make all modifications to the Work required in the furnishing and installation of the selected Unit Cost(s) to the approval of the Architect.
- B. No additional cost for modifications will be allowed, except as proposed on the Bid Form

1.04 SELECTION AND AWARD OF UNIT COSTS

- A. Indicate variation of Bid Price for Unit Cost(s) described below, and list in the Bid Form Document or any supplement to it, which requests a 'difference' in the Bid Price by addition or deduction from the Base Bid Price.
- B. Bid will be evaluated as outlined in the NOTICE TO CONTRACTORS CALLING FOR BIDS.

1.05 SCHEDULE OF UNIT COSTS

- A. Refer to the description of individual unit cost below:
 - 1. UNIT COST NUMBER ONE (1) - *description of unit cost.*
 - 2. UNIT COST NUMBER ONE (2) - *description of unit cost.*

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION 01 22 00

**ALTERNATES
SECTION 01 23 00**

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Alternates.
 - 3. Submission procedures.
 - 4. Documentation of changes to Contract Sum and Contract Time.
- B. Related Sections:
 - 1. Drawings and general provisions of Contract, including General and Supplementary Conditions, and Division 0 and Division 1 Specification Sections apply to work of this Section.
 - 2. Section 01 11 00: Summary of Work
 - a. This section describes work to be included in the base bid.

1.02 SUBMITTALS

- A. Alternates described in this Section are required to be reflected in the bid submitted on the Bid Form for this work.
- B. Do not submit alternates, other than described in this Section, except as provided for under the General and Supplementary Conditions of the Contract.

1.03 MODIFICATIONS

- A. Should the Owner elect to proceed on the basis of one or more of the Alternates, CONTRACTOR shall make all modifications to the Work required in the furnishing and installation of the selected alternate or alternates to the approval of the Architect.
- B. No additional cost for modifications will be allowed, except as proposed on the Bid Form

1.04 SELECTION AND AWARD OF ALTERNATES

- A. Indicate variation of Bid Price for Alternates described below, and list in the Bid Form Document or any supplement to it, which requests a 'difference' in the Bid Price by addition or deduction from the Base Bid Price.
- B. Bid will be evaluated as outlined in the NOTICE TO CONTRACTORS CALLING FOR BIDS.
- C. Owner shall have 180 calendar days to accept any alternates.

1.05 SCHEDULE OF ALTERNATES

- A. Refer to the description of alternates below:

- 1. ADDITIVE/DEDUCTIVE ALTERNATE NUMBER ONE (1) - *description of alternate.*
- 2. ADDITIVE/DEDUCTIVE ALTERNATE NUMBER ONE (2) - *description of alternate.*

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION 01 23 00

ADMINISTRATIVE REQUIREMENTS

SECTION 01 30 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1
 - 2. General administrative requirements
 - 3. Electronic document submittal service
 - 4. Preconstruction meeting
 - 5. Site mobilization meeting
 - 6. Progress meetings
 - 7. Construction progress schedule
 - 8. Contractor's daily reports
 - 9. Coordination drawings
 - 10. Submittals for review, information, and project closeout
 - 11. Number of copies of submittals
 - 12. Requests for Interpretation (RFI) procedures
 - 13. Submittal procedures
- B. Related Sections:
 - 1. Section 01 60 00 Product Requirements
 - a. General product requirements.
 - 2. Section 01 70 00 Execution and Closeout Requirements
 - a. Additional coordination requirements.

1.02 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Conform to requirements of Section 01 70 00 "Execution and Closeout Requirements" for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Architect:
 - 1. Requests for Interpretation (RFI)
 - 2. Requests for substitution
 - 3. Shop drawings, product data, and samples
 - 4. Test and inspection reports
 - 5. Design data
 - 6. Manufacturer's instructions and field reports
 - 7. Applications for payment and change order requests
 - 8. Progress schedules
 - 9. Coordination drawings.
 - 10. Correction Punch List and Final Correction Punch List for Notice of Completion.
 - 11. Closeout submittals.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL PROCESS

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an email system.
 - 1. Besides submittals for review, interpretation and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
 - 2. Contractor and Architect are required to use this process.
 - 3. It is Contractor's responsibility to submit documents in allowable format.
 - 4. Subcontractors, suppliers, and Architect's consultants are to be permitted to use the service at no extra charge.
 - 5. Users of the process need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
 - 6. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
- B. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 PRECONSTRUCTION MEETING

- A. Attendance Required:
 - 1. Owner
 - 2. Architect
 - 3. Contractor
- B. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 - 5. Designation of personnel representing the parties to Contract, Contractor and Architect.

6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 7. Scheduling.
- C. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.03 SITE MOBILIZATION MEETING

- A. Architect will schedule meeting at the Project site prior to Contractor occupancy.
- B. Attendance Required:
1. Owner
 2. Contractor
 3. Architect
 4. Contractor's superintendent
 5. Major subcontractors
- C. Agenda:
1. Use of premises by Owner and Contractor
 2. Owner's requirements and occupancy prior to completion
 3. Construction facilities and controls provided by Owner
 4. Temporary utilities provided by Owner
 5. Survey and building layout
 6. Security and housekeeping procedures
 7. Schedules
 8. Application for payment procedures
 9. Procedures for testing
 10. Procedures for maintaining record documents
 11. Requirements for start-up of equipment
 12. Inspection and acceptance of equipment put into service during construction period
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.

- B. Make arrangements for meetings, prepare agenda with copies for participants and preside at meetings.
- C. Attendance Required:
 - 1. Contractor's Project Manager
 - 2. Owner
 - 3. Architect
 - 4. Contractor's Superintendent.
 - 5. Major subcontractors
- D. Agenda:
 - 1. Review minutes of previous meetings
 - 2. Review of work progress
 - 3. Field observations, problems, and decisions
 - 4. Identification of problems that impede, or will impede, planned progress
 - 5. Review of submittals schedule and status of submittals
 - 6. Maintenance of progress schedule
 - 7. Corrective measures to regain projected schedules
 - 8. Planned progress during succeeding work period
 - 9. Maintenance of quality and work standards
 - 10. Effect of proposed changes on progress schedule and coordination
 - 11. Other business relating to work
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.05 CONSTRUCTION PROGRESS SCHEDULE

- A. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- B. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- C. Within 10 days after joint review, submit complete schedule.
- D. Submit updated schedule with each Application for Payment.

3.06 DAILY CONSTRUCTION REPORTS

- A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.
- B. Prepare a daily construction report recording the following information concerning events at Project site and project progress:

1. Date
2. High and low temperatures and general weather conditions
3. List of subcontractors at Project site
4. List of separate contractors at Project site
5. Material deliveries
6. Safety, environmental or industrial relations incidents
7. Meetings and significant decisions
8. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
9. Testing and/or inspections performed
10. List of verbal instruction given by Owner and/or Architect
11. Signature of Contractor's authorized representative

3.07 COORDINATION DRAWINGS

- A. Provide information required by Project Coordinator for preparation of coordination drawings.
- B. Update record drawings on a monthly basis as required as a release for progress payments.
- C. Review drawings prior to submission to Architect.

3.08 REQUESTS FOR INTERPRETATION (RFI)

- A. Definition: A request seeking one of the following:
 1. An interpretation, amplification, or clarification of some requirements of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in the Contract Documents.
 2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of the Contract Documents. Failure to submit an RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
 1. Prepare a separate RFI for each specific item.
 - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
 - b. Do not forward requests which solely require internal coordination between subcontractors.
 2. Prepare in a format and with content acceptable to Owner.
 3. Prepare using an electronic version of the form appended to this section.
 4. Combine RFI and its attachments into a single electronic file. PDF format is

preferred.

- C. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
 - 1. Include in each request Contractor's signature attesting to good faith effort to determine from the Contract Documents information requiring interpretation.
 - 2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
 - a. Approval of submittals (use procedures specified elsewhere in this section).
 - b. Approval of substitutions (see Section - 01 60 00 "Product Requirements")
 - 3. Improper RFIs: Requests not prepared in conformance to requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
 - 4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, the Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
- D. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
 - 1. Official Project name and number, and any additional required identifiers established in Contract Documents.
 - 2. Owner's, Architect's, and Contractor's names.
 - 3. Discrete and consecutive RFI number and descriptive subject/title.
 - 4. Issue date and requested reply date.
 - 5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
 - 6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
 - 7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example, routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

- F. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
 - 1. Indicate current status of every RFI. Update log promptly and on a regular basis.
 - 2. Note dates of when each request is made, and when a response is received.
 - 3. Highlight items requiring priority or expedited response.
 - 4. Highlight items for which a timely response has not been received to date.
 - 5. Identify and include improper or frivolous RFIs.
- G. Review Time: Architect will respond and return RFIs to Contractor within seven working days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 3:00 PM will be considered as having been received on the following regular working day.
 - 1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.
- H. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
 - 1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
 - 2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
 - 3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
 - 4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.09 SUBMITTAL SCHEDULE

- A. Submit to Architect for review a schedule for submittals in tabular format.
 - 1. Submit at the same time as the preliminary schedule.
 - 2. Coordinate with Contractor's construction schedule and schedule of values.
 - 3. Format schedule to allow tracking of status of submittals throughout duration of construction.
 - 4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
 - 5. Account for time required for preparation, review, manufacturing, fabrication, and delivery when establishing submittal delivery and review deadline dates.

3.10 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 - 1. Product data.
 - 2. Shop drawings.
 - 3. Samples for selection.
 - 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 70 00 "Execution and Closeout Requirements".

3.11 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 - 1. Design data.
 - 2. Certificates.
 - 3. Test reports.
 - 4. Inspection reports.
 - 5. Manufacturer's instructions.
 - 6. Manufacturer's field reports.
 - 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

3.12 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List.
- B. Submit Final Correction Punch List for Notice of Completion/Owner occupancy.
- C. When the following are specified in individual sections, submit them at project closeout in conformance to requirements of Section 01 70 00 "Execution and Closeout Requirements":
 - 1. Project record documents
 - 2. Operation and maintenance data
 - 3. Warranties
 - 4. Bonds
 - 5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

3.13 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
 - 1. After review, produce duplicates.
 - 2. Retained samples will not be returned to Contractor unless specifically so stated.

3.14 SUBMITTAL PROCEDURES

- A. General Requirements:
 - 1. Use a separate transmittal for each item.
 - 2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
 - 3. Transmit using approved form.
 - a. Use form included at the end of this Section.
 - 4. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
 - 5. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
 - 6. **Apply Contractor's stamp, signed or initialed** certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
 - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
 - 7. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties and is of the benefit to the project.
 - a. Upload submittals in electronic form per Electronic Document Submittal process.
 - 8. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - a. For each submittal for review, allow 21 calendar days excluding delivery time to and from the Contractor.
 - b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
 - 9. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
 - 10. Provide space for Contractor and Architect review stamps.
 - 11. When revised for resubmission, identify all changes made since previous submission.
 - 12. Distribute reviewed submittals. Instruct parties to promptly report inability to

comply with requirements.

13. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.

14. Submittals not requested will be recognized, and will be returned "Not Reviewed".

B. Product Data Procedures:

1. Submit only information required by individual specification sections.
2. Collect required information into a single submittal.
3. Submit concurrently with related shop drawing submittal.
4. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:

1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related work.
2. **Do not reproduce the Contract Documents** to create shop drawings.
3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

D. Samples Procedures:

1. Transmit related items together as single package.
2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

3.15 SUBMITTAL REVIEW

A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.

B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.

C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.

D. Architect's and his consultants' actions on items submitted for review:

1. Authorizing purchasing, fabrication, delivery, and installation:
 - a. "Reviewed" or language with same legal meaning.
 - b. "Reviewed and Corrected" resubmission not required, or language with same legal meaning.
 - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.

2. Not-Authorizing fabrication, delivery, and installation.
 - a. "Revise and Resubmit", or language with same legal meaning.
 - b. "Not Acceptable" or language with same legal meaning.
- E. Architect's and his consultants' actions on items submitted for information:
 1. Items for which no action was taken:
 - a. "Received" - to notify the Contractor that the submittal has been received for record only.
 2. Items for which action was taken:
 - a. "Reviewed" - no further action is required from Contractor.

END OF SECTION 01 30 00

**QUALITY REQUIREMENTS
SECTION 01 40 00**

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Submittals
 - 2. Quality assurance
 - 3. References and standards
 - 4. Testing and inspection agencies and services
 - 5. Control of installation
 - 6. Tolerances
 - 7. Defect Assessment
- B. Related Sections:
 - 1. Section 01 30 00: Administrative Requirements
 - a. Submittal procedures.
 - 2. Section 01 42 16: Definitions.
 - 3. Section 01 42 19: Reference Standards.
 - 4. Section 01 60 00: Product Requirements
 - a. Requirements for material and product quality.

1.02 REFERENCE STANDARDS

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2014).
- B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2016.
- C. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2012a.
- D. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2014a.
- E. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2015.
- F. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2010.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.
- C. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
 - 1. Include:
 - a. Date issued.
 - b. Project title and number.
 - c. Name of inspector.
 - d. Date and time of sampling or inspection.
 - e. Identification of product and specifications section.
 - f. Location in the Project.
 - g. Type of test/inspection.
 - h. Date of test/inspection.
 - i. Results of test/inspection.
 - j. Conformance with Contract Documents.
 - k. When requested by Architect, provide interpretation of results.
- D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
 - 1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 - 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
- E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- F. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.
 - 1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
 - 2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

1.04 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until the Notice of Completion.
- E. Should specified reference standards conflict with Contract Documents, the Contractor shall request clarification from Architect before proceeding.
- F. Neither the contractual relationships, duties nor responsibilities of the parties in the Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.05 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. Owner will employ and pay for services of an independent testing agency to perform other specified testing.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, the Contractor shall request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

- E. Have Work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, the Contractor shall request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

3.03 TESTING AND INSPECTION

- A. Testing Agency Duties:
 - 1. Test samples of mixes submitted by Contractor.
 - 2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 - 3. Perform specified sampling and testing of products in accordance with specified standards.
 - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 5. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
 - 6. Perform additional tests and inspections required by Architect.
 - 7. Attend preconstruction meetings and progress meetings.
 - 8. Submit reports of all tests/inspections specified.
- B. Limits on Testing/Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the Work.
 - 3. Agency may not assume any duties of Contractor.
 - 4. Agency has no authority to stop the Work.
- C. Contractor Responsibilities:
 - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.

2. Cooperate with laboratory personnel and provide access to the Work and to manufacturers' facilities.
 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
 4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.
- E. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

3.04 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not conforming to specified requirements.

END OF SECTION 01 40 00

REGULATORY REQUIREMENTS

SECTION 01 41 00

PART 1 GENERAL

1.01 GOVERNING AGENCY

A. The governing agencies having review over this project are as follows:

1. City of Shafter:
 - a. Building Department (Structural, Access, Mechanical/Plumbing and Electrical).
 - b. Public Works Department (offsite improvements, special transportation permits).
 - c. Planning Department (site drainage and storm drain systems).
1. County of Kern:
 - a. Fire Department
 - b. Environmental Health Services Department (food service and septic tank permits).

1.02 LAWS AND REGULATIONS

A. The project shall be constructed under the jurisdiction of all laws of the State of California governing the construction of public buildings including:

1. California Code of Regulations, Title 8.
2. California Code of Regulations, Title 19, Public Safety, State Fire Marshal Regulations.
3. California Code of Regulations, Title 24:
 - a. 2022 California Building Standards Administrative Code (Part 1).
 - b. 2022 California Building Code Volumes 1 and 2 (Part 2).
 - c. 2022 California Electrical Code (Part 3).
 - d. 2022 California Mechanical Code (Part 4).
 - e. 2022 California Plumbing Code (Part 5).
 - f. 2022 California Energy Code (Part 6).
 - g. 2022 California Fire Code (Part 9).
 - h. 2022 Existing Building Code (Part 10).
 - i. 2022 California Green Building Standards Code (Part 11);
 - j. 2022 California Referenced Standards Code, Title 24 C.C.R. (Part 12)
4. 2022 NFPA 13, Installation of Fire Sprinkler Systems, California amended.
5. 2019 NFPA 14, Installation of Standpipe and Hose Systems
6. 2021 NFPA 17, Dry Chemical Extinguishing Systems
7. 2021 NFPA 17A, Wet Chemical Extinguishing Systems
8. 2013 NFPA 25, Inspection, Testing, Maintenance of Water-Based Fire Protection Systems, California amended.

9. 2022 NFPA 72, National Fire Alarm Code, California amended.
See UL Std. 1971 for "Visual Devices."
10. 2019 NFPA 80 Fire Door and Other Opening Protectives.
11. 2019 NFPA 253 Critical Radiant Flux of Floor Covering Systems.
12. 2018 NFPA 2001 Clean Agent for Fire Extinguishing Systems.
13. Occupational Health and Safety Act.
14. Interpretive Manuals, Code Rules, and Safety Orders of:
 - a. Division of Industrial Safety.
 - b. Department of Industrial Relations.
 - c. Other Agencies.
15. San Joaquin Valley Air Quality Management District

B. Nothing in the plans or specifications is to be construed to permit work not in conformance with any applicable code or regulation.

C. Other Regulatory Requirements and General Conditions:

1. T-24, Parts 1-12 (as applicable) must be kept on site during construction.
2. If any conflicts or inconsistencies exist between the specifications and the drawings (including the General Notes), the drawings and General Notes shall take precedence.
3. All Addenda must be signed by the Architect and approved by the local authority.
4. The Construction Change Documents must be signed by the owner and approved by the following:
 - a. Architect/Engineer of Record
 - b. Structural Engineer (when applicable)
 - c. Delegated professional engineer (when applicable)

D. The Project Inspector and testing lab must be employed by the owner and approved by the following:

1. Architect/Engineer of Record
2. Structural Engineer (when applicable)

PART 2 PRODUCT – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION 01 41 00

**DEFINITIONS
SECTION 01 42 16**

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. This section supplements the definitions contained in the General Conditions.
 - 2. Other definitions are included in individual specification sections.

1.02 DEFINITIONS

- A. Furnish: To supply, deliver, unload, and inspect for damage.
- B. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.
- C. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never used, or re-used materials or equipment.
- D. Project Manual: The book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.
- E. Provide: To furnish and install.
- F. Supply: Same as Furnish.

PART 2 PRODUCTS NOT USED

PART 3 EXECUTION NOT USED

END OF SECTION 01 42 16

REFERENCE STANDARDS SECTION 01 42 19

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Requirements relating to referenced standards.
 - 2. Reference standards full title and edition date.

1.02 QUALITY ASSURANCE

- A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue specified in this section, except where a specific date is established by applicable code.
- C. Obtain copies of standards when required by the Contract Documents.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Date of Notice of Completion.
- E. Should specified reference standards conflict with Contract Documents, the Contractor shall request clarification from the Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Architect shall be altered by the Contract Documents by mention or inference otherwise in any reference document.

1.03 CONSTRUCTION INDUSTRY ORGANIZATION DOCUMENTS

- A. AAMA -- AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION
 - 1. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; 2011.
 - 2. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).
 - 3. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
 - 4. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2013.
 - 5. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to

Site; 2015.

B. ACI -- AMERICAN CONCRETE INSTITUTE INTERNATIONAL

1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).
2. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 2022.
3. ACI 211.2 – Standard Practice for Selecting Proportions for Structural Lightweight Concrete; 1998.
4. ACI 214R – Guide to Evaluation of Strength Test Results of Concrete; 2011.
5. ACI 301 - Specifications for Structural Concrete; 2020.
6. ACI 302.1R - Guide for Concrete Floor and Slab Construction; 2015.
7. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; Reapproved 2009.
8. ACI 305R - Guide to Hot Weather Concreting; 2020.
9. ACI 306R - Cold Weather Concreting; 2016.
10. ACI 306.1 - Cold Weather Concreting; 1990 (Reapproved 2002).
11. ACI 308R - Guide to Curing Concrete; 2016.
12. ACI 309R – Guide for Consolidation of Concrete; 2005.
13. ACI 318 – Building Code Requirements for Structural Concrete; 2019.
14. ACI 347R - Guide to Formwork for Concrete; 2014.
15. ACI SP-66 – Details and Detailing of Concrete; 2004.

C. AISC -- AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC.

1. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges; 2016.

D. ANSI -- AMERICAN NATIONAL STANDARDS INSTITUTE

1. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2017.
2. ANSI A135.4 - American National Standard for Basic Hardboard; 2012.
3. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2019.
4. ANSI A208.1 - American National Standard for Particleboard; 2009.
5. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015.

E. ASTM INTERNATIONAL

1. ASTM A1 - Standard Specification for Carbon Steel Tee Rails; 2000 (Reapproved 2010).
2. ASTM A6/A6M – Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling; 2017.
3. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
4. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2003
5. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
6. ASTM A82 – Standard Specification for Steel Wire, Plain for Concrete; 2002.

7. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished; 2013.
8. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
9. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
10. ASTM A184/A184M – Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement; 2019.
11. ASTM A242/A242M - Standard Specification for High-Strength Low-Alloy Structural Steel; 2013.
12. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.
13. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.
14. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2009a (Reapproved 2016).
15. ASTM A449 - Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use; 2014.
16. ASTM A497A/A497M – Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete; 2002.
17. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
18. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
19. ASTM A514/A514M - Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding; 2014.
20. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality; 2014.
21. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts; 2015.
22. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts (Metric); 2007 (Reapproved 2013).
23. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel; 2018.
24. ASTM A588/A588M - Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi (345 MPa) Minimum Yield Point, with Atmospheric Corrosion Resistance; 2015.
25. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2015.
26. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.
27. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless-Steel Sheet, Strip, Plate, and Flat Bar; 2015.
28. ASTM A704A/A704M – Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement; 2017.

29. ASTM A706/A706M – Standard Specification for Deformed and Plain Low-alloy Steel Bars for Concrete Reinforcement; 2016.
30. ASTM A759 - Standard Specification for Carbon Steel Crane Rails; 2010 (Reapproved 2016).
31. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2014.
32. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2011 (Reapproved 2015).
33. ASTM A996/A996M – Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement; 2016.
34. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.
35. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2015.
36. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2017.
37. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
38. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus; 2016.
39. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
40. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.
41. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
42. ASTM C31/C31M – Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2018.
43. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2018.
44. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2016b.
45. ASTM C40 – Standard Test Method for Organic Impurities in Fine Aggregates for Concrete; 2004.
46. ASTM C42/C42M – Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete; 2020.
47. ASTM C87 – Standard Test Method for Effect of Organic Impurities in Fine Aggregate on Strength of Mortar; 2005.
48. ASTM C88 – Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate; 2013.
49. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2016a.
50. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2016a.
51. ASTM C128 - Standard Test Method for Relative Density (Specific Gravity) and Absorption of Fine Aggregate; 2022.

52. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2006.
53. ASTM C138/C138M - Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete; 2017.
54. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units; 2018.
55. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2015a.
56. ASTM C150/C150M - Standard Specification for Portland Cement; 2018.
57. ASTM C157 – Standard Test Method for Length Change of Hardened Cement Mortar and Concrete; 1975.
58. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete; 2020.
59. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete; 2017.
60. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2016.
61. ASTM C231 - Standard Test Method for air Content of Freshly Mixed Concrete by the Pressure Method; 2009.
62. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).
63. ASTM C295 – Standard Guide for Petrographic Examination of Aggregates for Concrete; 2008.
64. ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2019.
65. ASTM C330 – Standard Specification for Lightweight Aggregates for Structural Concrete; 2017.
66. ASTM C332 - Standard Specification for Lightweight Aggregates for Insulating Concrete; 2017.
67. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2016e1.
68. ASTM C404 – Standard Specification for Aggregates for Masonry Grout; 2018.
69. ASTM C426 – Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units; 2016.
70. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017.
71. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2016.
72. ASTM C495 – Standard Test method for Compressive Strength of Lightweight Insulating Concrete; 2007.
73. ASTM C501 - Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser; 1984 (Reapproved 2015).
74. ASTM C514 - Standard Specification for Nails for the Application of Gypsum Board; 2004 (Reapproved 2014).

75. ASTM C567 – Standard Method for Determining Density of Structural Lightweight Concrete; 2019.
76. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.
77. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.
78. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.
79. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2014.
80. ASTM C779/C779M – Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces; 2012.
81. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2015a.
82. ASTM C805 – Standard Test Method for Rebound Number of Hardened Concrete; 2002.
83. ASTM C827/C827M - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures; 2016.
84. ASTM C834 - Standard Specification for Latex Sealants; 2014.
85. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2018.
86. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2015).
87. ASTM C881/C881M – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2020.
88. ASTM C903 - Standard Practice for Preparing Refractory Specimens by Cold Gunning; 2015.
89. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.
90. ASTM C979/C979M – Standard Specification for Pigments for Integrally Colored Concrete; 2013.
91. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2018.
92. ASTM C1019 – Standard Test Method for Sampling and Testing Grout for Masonry; 2016.
93. ASTM C1028 – Standard Test method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surface by the Horizontal Dynamometer Pull-Meter Method; 2006.
94. ASTM C1036 - Standard Specification for Flat Glass; 2016.
95. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
96. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2013.
97. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2016.

98. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014a.
99. ASTM C1155 – Standard Practice for Determining Thermal Resistance of Building Envelope Components from the In-Situ Data; 2021.
100. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.
101. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).
102. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing; 2013a.
103. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2014.
104. ASTM C1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete; 2019.
105. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus; 2011.
106. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2015.
107. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
108. ASTM C1586 – Standard Guide for Quality Assurance of Mortars; 2005 (Reapproved 2011).
109. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2018.
110. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2016.
111. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017.
112. ASTM D523 - Standard Test Method for Specular Gloss; 2014.
113. ASTM D543 - Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents; 2014.
114. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 1998 (Reapproved 2010).
115. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2014.
116. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics; 2015.
117. ASTM D714 - Standard Test Method for Evaluating Degree of Blistering of Paints; 2002 (Reapproved 2009).
118. ASTM D790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials; 2016.
119. ASTM D822/D822M - Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings; 2013.
120. ASTM D994/D994M - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type); 2011 (Reapproved 2016).

121. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³); 2012.
122. ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments; 2008.
123. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types); 2004 (Reapproved 2013).
124. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).
125. ASTM D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine; 2011.
126. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting; 2015.
127. ASTM D2178/D2178M - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing; 2015a.
128. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015.
129. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates; 2016.
130. ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact) ; 1993 (Reapproved 2010).
131. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2016.
132. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2016.
133. ASTM D3359 - Standard Test Method for Measuring Adhesion by Tape Test; 2009.
134. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2015.
135. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2018).
136. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018B.
137. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).
138. ASTM E94 - Standard Guide for Radiographic Examination; 2004 (Reapproved 2010).
139. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
140. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2017.
141. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2018B.

142. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover; 2008a (Reapproved 2013).
143. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments; 2013.
144. ASTM E165/E165M - Standard Test Method for Liquid Penetrant Examination for General Industry; 2012.
145. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
146. ASTM E329 – Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Testing; 2021.
147. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2016).
148. ASTM E413 - Classification for Rating Sound Insulation; 2016.
149. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2017.
150. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2017A.
151. ASTM E709 - Standard Guide for Magnetic Particle Testing; 2015.
152. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.
153. ASTM E1155 - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers; 2020.
154. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.
155. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
156. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference; 2005 (Reapproved 2017).
157. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2011.
158. ASTM E1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference; 1995 (Reapproved 2011).
159. ASTM E1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems; 2011.
160. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

161. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes; 2017.
162. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
163. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions; 2016.
164. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
165. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners; 2013.
166. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2014).
167. ASTM F1292 – Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment; 2004.
168. ASTM F1487 – Standard Consumer Safety Performance Specification for Playground Equipment for Public Use; 2001.
169. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2015.
170. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).
171. ASTM F1951 - Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment; 1999.
172. ASTM F2408 - Standard Specification for Ornamental Fences Employing Galvanized Steel Tubular Pickets; 2016.
173. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.
174. ASTM G23 – Standard Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials; 1981.
175. ASTM G155 - Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials; 2013.

F. AWS -- AMERICAN WELDING SOCIETY

1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
2. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
3. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014.
4. AWS D1.4/D1.4M – Structural Welding Code – Reinforcing Steel; 2018.
5. AWS D1.8/D1.8M – Structural Welding Code – Seismic Supplement; 2016.

G. BHMA -- BUILDERS HARDWARE MANUFACTURERS ASSOCIATION

1. BHMA A156.9 - American National Standard for Cabinet Hardware; 2015.

- H. CDA -- COPPER DEVELOPMENT ASSOCIATION, INC.
 - 1. CDA A4050 - Copper in Architecture - Handbook; current edition.
- I. CRI -- CARPET AND RUG INSTITUTE
 - 1. CRI 104 - Standard for Installation of Commercial Carpet; 2015.
 - 2. CRI (GLP) - Green Label Plus Testing Program - Certified Products; www.carpet-rug.org; current edition.
- J. FM -- FACTORY MUTUAL GLOBAL
 - 1. FM (AG) - FM Approval Guide; current edition.
- K. GA -- GYPSUM ASSOCIATION
 - 1. GA-216 - Application and Finishing of Gypsum Board; 201.
- L. GANA -- GLASS ASSOCIATION OF NORTH AMERICA
 - 1. GANA (GM) - GANA Glazing Manual; 2009.
 - 2. GANA (SM) - GANA Sealant Manual; 2008.
- M. IAS -- INTERNATIONAL ACCREDITATION SERVICE
 - 1. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc; 2017.
- N. IGMA -- INSULATING GLASS MANUFACTURERS ALLIANCE
 - 1. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (2004).
- O. ITS -- INTERTEK TESTING SERVICES NA, INC.
 - 1. ITS (DIR) - Directory of Listed Products; current edition.
- P. MPI -- MASTER PAINTERS INSTITUTE (MASTER PAINTERS AND DECORATORS ASSOCIATION)
 - 1. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.
- Q. NEMA -- NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
 - 1. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- R. NFPA -- NATIONAL FIRE PROTECTION ASSOCIATION
 - 1. NFPA 10 - Standard for Portable Fire Extinguishers; 2021.
 - 2. NFPA 241- Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2022.
 - 3. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2017.
 - 4. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2019.
 - 5. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.

- S. NFRC -- NATIONAL FENESTRATION RATING COUNCIL, INC.
 - 1. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2014.
 - 2. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2014.
 - 3. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2014.
- T. RCSC -- RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS
 - 1. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2014, with April 2015 Errata.
- U. SMACNA -- SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION, INC.
 - 1. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.
- V. SSPC -- SOCIETY FOR PROTECTIVE COATINGS
 - 1. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
 - 2. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
 - 3. SSPC-SP 1 - Solvent Cleaning; 2015.
 - 4. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).
 - 5. SSPC-SP 3 - Power Tool Cleaning; 1982 (Ed. 2004).
 - 6. SSPC-SP 5 - White Metal Blast Cleaning; 2007.
 - 7. SSPC-SP 6 - Commercial Blast Cleaning; 2007.
 - 8. SSPC-SP 7 - Brush-Off Blast Cleaning; 2007.
 - 9. SSPC-SP 10 - Near-White Blast Cleaning; 2007.
 - 10. SSPC-SP 11 - Power Tool Cleaning to Bare Metal; 2012 (Ed. 2013).
 - 11. SSPC-SP 13 - Surface Preparation of Concrete; (Reaffirmed 2015); 2003.
- W. SWRI -- SEALANT, WATERPROOFING AND RESTORATION INSTITUTE
 - 1. SWRI (VAL) - SWRI Institute Validated Products Directory; Current Listings at www.swrionline.org.
- X. TCNA -- TILE COUNCIL OF NORTH AMERICA, INC.
 - 1. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2024.
- Y. UL -- UNDERWRITERS LABORATORIES INC.
 - 1. UL (DIR) - Online Certifications Directory; Current listings at database.ul.com.
 - 2. UL (FRD) - Fire Resistance Directory; current edition.
 - 3. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
 - 4. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

5. UL 263 - Standard for Fire Tests of Building Construction and Materials; Current Edition, Including All Revisions.

Z. WI -- WOODWORK INSTITUTE

1. WI (CCP) - Certified Compliance Program (CCP); current edition at www.woodworkinstitute.com.
2. WI (MAN) - Manual of Millwork; 2024.

1.04 UNITED STATES GOVERNMENT AND RELATED AGENCIES DOCUMENTS

A. UNITED STATES CODE

1. Title 7, United States Code, 136 through 136y - Federal Insecticide, Fungicide and Rodenticide Act; 1947 (Revised 2001).

B. CFR -- CODE OF FEDERAL REGULATIONS

1. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
2. CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
3. CFR 37 - Transportation Services for Individuals with Disabilities (ADA); current edition.

C. ATBCB -- US ARCHITECTURAL AND TRANSPORTATION BARRIERS COMPLIANCE BOARD (THE ACCESS BOARD)

1. ATBCB PROWAG - Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way; 2011.

D. PS -- PRODUCT STANDARDS

1. PS 1 - Structural Plywood; 2009.
2. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; 2010.
3. PS 20 - American Softwood Lumber Standard; 2015.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION 01 42 19

TESTS AND INSPECTIONS

SECTION 01 45 23

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1
2. Tests and inspections of materials
 - a. Earthwork:
 - 1) Inspection of sub-grade improvement operations, compacted fill, and field density tests.
 - b. Concrete Work:
 - 1) Testing and certification of concrete ingredients, compression cylinders, reinforcing steel, and placement inspections.
 - c. Concrete Unit Masonry:
 - 1) Testing and certification of concrete block units, mortar and grout ingredients, compression cylinders, reinforcing steel, and continuous placement inspections.
 - d. Structural Steel:
 - 1) Sampling and testing of required specimens, inspection of structural fabrication, shop welding, and field welding as required.
 - e. Wood:
 - 1) Lumber and Plywood:
 - a) Materials shall be per 2022 California Building Code, Section 2303.1.
 - 2) Glue-Laminated Members:
 - a) Special inspection per 2022 California Building Code, Section 1705A.5.5 and 2303.1.3.

1.02 QUALITY ASSURANCE

A. Regulatory Compliance:

1. Conform to local authority having jurisdiction (Kern County or City of Shafter).

B. Owner's Inspector:

1. An inspector employed by the Owner in accordance with the requirements of the State of California Code of Regulations, Title 24, will be assigned to the work.
 - a. Duties are specifically defined in Title 24, Part I, Section 4-342.
 - b. The work of construction in all stages of progress shall be subject to the personal continuous observation of the inspector.
 - c. They have free access to any or all parts of the work at any time.
 - d. The Contractor shall furnish the inspector reasonable facilities for obtaining such information as may be necessary to keep him fully informed respecting the progress and manner of the work and the character of the materials.
 - e. Inspection of the work shall not relieve the Contractor of any obligation to fulfill this Contract.

1.03 SPECIAL PROVISIONS

A. The laboratory shall be approved by Owner, Architect, and Structural Engineer.

B. The laboratory shall be in the employ of the Owner.

C. Duties of Testing Laboratory:

1. Inspect stock, mark identified stock, select and mark test specimens, perform required tests, inspections as specified, furnish required reports and certificates.

D. Reports:

1. Reports are to be executed immediately upon conclusion of each procedure and forwarded to:
 - a. Architect
 - b. Structural Engineer
 - c. Construction Manager
 - d. Contractor
 - e. Owner
 - f. Subcontractor
2. Payment:
 - a. The Owner shall pay for all tests, except the costs of concrete mix design.
 - b. When in the opinion of the Architect, additional tests are required, then such tests and inspection shall be paid for by the Owner, but the amount paid shall be deducted from the Contract Price.
 - c. Examples of such additional tests are:
 - 1) Tests of material substituted for previously accepted materials, unidentified materials, re-tests made necessary by the failure of materials to comply with the requirements of the specifications, and load tests necessary because certain portions of the structure have not fully met specification or plan requirements.

3. Selection of Samples:
 - a. All samples and specimens for testing shall be selected by the inspector or by the testing laboratory, but not by the Contractor.
 - b. The Contractor shall, at his own expense, furnish, package, mark, and deliver all samples to be tested, when so directed by the inspector, testing laboratory, or as required by the specifications.
 - c. Delivery of samples to the testing laboratory shall be made in ample time to allow tests to be made without delaying construction.
 - d. No extra time will be allowed for the completion of the work by reason of a delay in testing samples.
 - e. The Contractor shall allow free access at all times to the representatives of the testing laboratory to the sources from which samples are taken.
4. Preparation of Specimens:
 - a. Taken by, and at expense of fabricator, under direction of testing laboratory and machined or prepared to conform to appropriate ASTM specification.
 - b. The cost of machining specimens is considered part of the testing.
5. Architect and Structural Engineer reserve the right to demand for test and special examination of any materials, or part thereof, to ensure compliance with specifications, and may reject for satisfactory replacement, any material, or part judged defective, as a result thereof.
 - a. This also applies to materials or sources of same substituted for those previously approved.
 - b. Such tests or examinations, even though not specified, shall be performed as and when required.
 - c. Costs paid for by Owner, but the amount paid shall be deducted from the Contract.
6. Owner's Right to Waive Tests and Inspections:
 - a. The Owner reserves the right to waive any part, or all of the tests and inspections, subject to the approval of the Architect, and Structural Engineer.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

1.01 SEQUENCING AND SCHEDULING

- A. Coordinate work with that of other trades in time to avoid delays to the overall work progress.
- B. The laboratory shall cooperate with all trades whose work affects or is affected by the tests and inspections.
- C. Contractor to cooperate with and provide testing laboratory opportunity and assistance in taking samples, making field tests, and making inspections.

1.02 TESTS AND INSPECTIONS

- A. All special inspections shall conform to the requirements of Chapter 17A of Title 24, Part 2, California Building Code (CBC) 2022.

1.03 EARTHWORK (Refer to Section 31 22 00 “Earthwork”)

- A. Excavations and Foundations:
 - 1. Chapter 17A:
 - a. Inspections:
 - 1) Earth fill compactions: 1705A.6 and Table 1705A.6
 - 2. Testing Agency:
 - a. Any required foundation consultation, examination, or testing shall be done by an approved Foundation Engineer.
 - b. Costs paid by Owner.
- B. Consultation or Procedures for this part of the work shall be only as requested by the Architect and Structural Engineer at the time work on the site is commenced and may consist of the following:
 - 1. Examination of building sub-grade resulting from the cutting operation, including field density tests if considered necessary.
 - 2. Verify completed foundation excavations.
 - 3. Periodic inspection of any required filling and backfilling, including field density tests if considered necessary.
 - 4. Imported or Native Fill Material: Approved material, perform suitability tests for compaction, qualities, and optimum moisture if required.
 - 5. Provide Continuous Inspection Supervision during removal and re-compaction of existing soil and placement of fill.
 - 6. Inspect and approve completed footing excavations.
 - 7. Field Density Tests shall be made on samples from material in place as required to verify proper compaction densities of fills and backfills.
- C. Densities and Method:
 - 1. Densities specified relate to ASTM Designation D1557 Procedure A.
- D. Tests
 - 1. The initial testing shall be paid for by the Owner. If the compaction test results are less than the specified amount, the compaction shall be deemed unacceptable. The earthwork shall be reworked and retested. The Contractor shall pay all costs of these core tests.

1.04 CONCRETE WORK (Refer to Section 03 31 00 "Structural Concrete Work")

A. Inspections:

1. Batch Plant or Weighmaster Inspection: 1705A.3.3.
2. Reinforcing Bar Welding Inspection: 1705A.3.1 and 1705A.2.5.
3. Notification:
 - a. The Contractor shall notify the following people, giving advance notice prior to commencing the designated work:
 - 1) Person Notified: Architect and Construction Manager
 - a) Advance Notice: Two Business Days
 - b) Prior to Commencing: Form Work
 - c) For Inspection: Excavation
 - 2) Person Notified: Architect, Construction Manager, and Inspector
 - a) Advance Notice: Two Business Days
 - b) Prior to Commencing: Pouring Concrete
 - c) For Inspection: Forms and Steel
 - 3) Person Notified: Governing Agency
 - a) Advance Notice: Three Business Days
 - b) Advance Notice: Three Business Days
 - c) For Inspection: Forms and Steel
4. Bonded Weighmaster Certificates
 - a. Non-structural concrete such as floor slabs on grade, walks, curb & gutter, etc., shall not require continuous batch plant inspection, but instead, a bonded weighmaster shall furnish notarized affidavits certifying that quantities and quality of all materials used in the concrete instead, a bonded weighmaster shall furnish notarized affidavits certifying that quantities and quality of all materials used in the concrete are in accordance with these specifications and the approved mix design.
5. Batch Plant Inspections: When transit mixed concrete is used, continuous inspection shall be maintained at the plant by a qualified concrete technician who shall issue tickets certifying that quantities and quality of all materials used in the concrete are in accordance with these specifications and the approved design mix.
 - a. The Owner will pay the costs of this inspection.
 - b. This inspection will not be required for non-structural concrete as indicated in C.B.C. Section 1705A.3.
6. No concrete shall be poured except in the presence of the Owner's Inspector and only after the forms and reinforcing steel have been approved by the Architect or his representative.

B. Tests:

1. All concrete materials to be tested and reported prior to any use of same.
2. Cementitious materials and limits on shall conform to the requirements of ACI 318, CBC Sections 1903A and 1903A.6, and ASTM C150.
 - a. One sample shall be taken for each 100 tons of cement, except that when used in bulk loading ready mix plants where separate bins for pre-tested

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 if required by the Architect, or the Structural Engineer.

3. The aggregates shall be in conformance with ACI 318, as modified by CBC Section 1903A.5.
4. Reinforcing Steel is to be tested prior to use for compliance with CBC Section 1910A.2 and ASTM A615 requirements.
 - a. Samples: To be selected by representative of testing laboratory from material at the building site or place of distribution, to consist of two (2) pieces, each 18 inches (18") long of each size, furnished, cut, and prepared for testing by Contractor, marked and delivered by representative of testing laboratory.
 - b. Tests: One (1) tension and one (1) bend test shall be made of each size of reinforcing steel, including wire fabric. One (1) series of tests shall be made for each ten (10) tons, or fraction thereof, of each size of reinforcing steel if the bundles, as delivered, can be identified as to heat number and the mill analysis accompanies the report. If they cannot be identified as to heat number, then one (1) series of tests shall be made from each two and one-half (2-1/2) tons or fraction thereof.
5. Cylinder Tests shall comply with CBC Section 1905A.1.16.
 - a. Three (3) cylinders of concrete shall be made for each fifty (50) cubic yards of each grade of concrete, or fraction thereof, being placed each day. Each cylinder shall be dated, given a number, the point in the structure from which the sample was taken noted thereon, and the slump noted thereon.
 - b. Test cylinders shall be made at the job and stored in the testing laboratory in accordance with ASTM C31. At the end of twenty-four (24) hours after making, the cylinders shall be stored under moist curing conditions at approximately 70 degrees F. and maintained therein until tested. The cylinders shall be tested in accordance with ASTM C39. The cylinders shall develop the following minimum ultimate compressive strengths:
 - 1) Design Strength: 3000 psi
 - a) 7 Day Test: 1800 psi
 - b) 28 Day Test: 3000 psi
 - 2) Design Strength: 4000 psi
 - a) 7 Day Test: 2300 psi
 - b) 28 Day Test: 4000 psi
 - c. If the strengths of the first two-cylinder tests are satisfactory, the third cylinder shall not be tested, but destroyed. A third cylinder shall be tested if the strengths of the first two cylinders are not satisfactory.
 - d. If the strength of the cylinders does not meet the minimum as mentioned above, core tests of the hardened concrete shall be made as per CBC Section ACI 318, Section 5.5.5.2 and ASTM C42. If the core tests show the concrete strength to be deficient, the concrete shall be deemed defective and removed. The Contractor shall pay all costs of these core tests.

- C. Laboratory Designed Mixes: See Proportioning of Concrete Mixes, Section 03 31 00 "Structural Concrete Work".

1.05 CONCRETE UNIT MASONRY (Refer to Section 04 22 00 "Reinforced Concrete Unit Masonry")

A. Inspections:

1. Masonry Inspection: (CBC Section 1705A.4).
 - a. All structural masonry work shall be continuously inspected during laying and grouting by an Inspector specially approved for that purpose. The Inspector shall assist the testing agency in making test samples, and perform such tests as are required, and shall check the materials, details of construction, and construction procedures.
 - 1) The special masonry Inspector shall furnish a verified report that, of his own personal knowledge, the work covered by the report has been performed and materials used and installed in every material respect in compliance with the duly approved plans and specifications.
2. Reinforcing Bar Welding Inspection: CBC 1705A.3.1 and 1705A.2.5, AWS D1.4.
3. Notification: The Contractor shall notify the following people, giving advance notice prior to commencing the designated work:
 - a. Person Notified: Architect, Construction Manager, and Inspector
 - 1) Advance Notice: Two Business Days
 - 2) Prior to Commencing: Grouting Wall (each lift), Laying of Concrete Block
 - 3) For Inspection: Block Work and Steel
 - b. Person Notified: Architect, Construction Manager, Inspector, and DSA
 - 1) Advance Notice: Three Business Days
 - 2) Prior to Commencing: Masonry and Footing
 - 3) For Inspection: Masonry and Footing
4. Grout Placement:
 - a. No grout shall be placed, except in the presence of the Owner's Inspector (if one is employed on the job) and only after the block work and reinforcing steel have been approved by the Architect or his representative.
5. All masonry shall be continuously inspected during laying and grouting by an inspector specially approved for that purpose by DSA.
6. Special inspection is required during all High-Lift Grouting of concrete block, as required per DSA IR 21-2.13.

B. Tests:

1. The concrete block shall be tested using the methods and procedures ASTM C140. It shall be tested and approved before any concrete block is laid. Linear shrinkage tests shall conform to ASTM C426.
2. Mortar and Grout (Comply with CBC Section 2105A.3):
 - a. Test Samples:

- 1) At the beginning of all masonry work, field sampling shall be done in accordance with the ASTM C1586 and ASTM C1019; one (1) set of the mortar and grout shall be taken on three (3) successive working days and at least at one-week intervals thereafter. The samples shall be continuously stored in moist air until tested, for each test given in Table 1 below. All samples shall meet the minimum strengths given therein.
 - A) Additional samples shall be taken whenever any change in materials or job conditions occur, or change in materials or job conditions occur, or whenever in the judgment of the Architect, the Owner's Inspector, or DSA, such tests are necessary to determine the quality of the material.
- 2) Mortar test specimens 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 twenty-four (24) hours, after which the specimens shall be stored and tested as required for concrete cylinders.

In making grout test specimens, 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 has hardened. The prisms shall be stored as required for concrete cylinders. They shall be tested in the vertical position.

b. Masonry Core Tests (2022 CBC Section 2105A.4):

- 1) Not less than two (2) cores having a diameter of six (6) inches shall be taken from each project. Two (2) cores shall be taken from each building for each 5,000 square feet of the greater of the wall area, or the floor area or fraction thereof. The Architect or Structural Engineer in responsible charge of the project or the Inspector shall select the areas for sampling. One half of the number of cores taken shall be tested in shear. The shear wall loadings shall test both joints between the grout core and the outside wythes of the masonry. Core samples shall not be soaked before testing. Materials and workmanship shall be such that for all masonry, when tested in compression, cores shall show an ultimate strength at least equal to 1,500 psi. When tested in shear, the unit shear on the cross section of the core shall be not less than 97 psi.
- 2) Shear testing apparatus shall be of a design approved by DSA. Visual examination of all cores shall be made to ascertain if the joints are filled.
- 3) The testing agency shall inspect the coring of the masonry walls and shall prepare a report of coring operations for the testing laboratory files and mail one copy to DSA, plus provide copies to the Contractor, Inspector, Construction Manager, and Architect. Such reports shall include the total number of cores cut, the location, and the condition of all cores cut on each project, regardless of whether or not the core specimens failed during cutting operation. All cores shall be submitted to the laboratory for examination.

- 4) Note:
 - a) The contractor shall restore walls from which cores are taken with whole face shells or complete units, as approved by Architect.
- c. Cement: Refer to Concrete Work of this Section.
- d. Aggregates: Test samples of the aggregates to be used in the grout and mortar shall be taken and tested in accordance with ASTM C404.
- e. Reinforcing Steel: Refer to Section 3.04 "Concrete Work" of this Section.

TABLE 1

MINIMUM MORTAR AND GROUT STRENGTHS COMPRESSION TESTS

1. Specimen: Mortar on 2-inch x 4-inch cylinders
 - a. At 7 Days: 1100 psi
 - b. At 28 Days: 1800 psi
2. Specimen: Grout in typical prism
 - a. At 7 Days: 1200 psi
 - b. At 28 Days: 2000 psi

1.06 STRUCTURAL STEEL (Refer to Section 05 12 00 "Structural Steel Framing")

- A. Inspections: All structural welding, both shop and field welding, shall be done under the supervision of a qualified welding inspector, qualified in accordance with CBC Section 1705A.2.1, the American Welding Society, CWI, or CAWI, approved by the Architect and the Structural Engineer.
- B. The inspector shall furnish the Architect and the Structural Engineer with a report on forms supplied that the welding which is required to be inspected is proper and has been done in conformity with the plans and specifications.
- C. He shall check the material, equipment, and procedure, as well as the welds, and the ability of the welding.
- D. The welding inspector shall be employed by the testing laboratory. Inspection of welding shall be according to 2022 California Building Code, Section 1704A.2.1.
- E. Inspection of shop fabrication shall be according to CBC Section 1705A.2.5, AWS D1.1, D1.8 and the approved drawings.
- F. Tests:
 1. All structural steel that is to be tested shall be identified per CBC Section 2203A.1 on the "Order for Tests and Inspections" sheet, which is issued at the start of the job. It shall be tested and approved by the testing laboratory prior to fabrication or delivery.
 2. If the steel can be identified in accordance with ASTM A6 and is accompanied by mill analysis and test reports for each heat, it may be used without testing. Identification of the steel at the fabricator's plant shall be made by a representative of the testing laboratory.

3. Unidentified structural steel shall be tested to determine conformity to the applicable ASTM standard. It shall be tested and approved by the testing laboratory prior to fabrication or delivery. If the steel can be identified in accordance with ASTM A6 and is accompanied by mill analysis and test reports for each heat, it may be used without testing. Identification of the steel at the fabricator's plant shall be made by a representative of the testing laboratory.
4. When the steel cannot be identified or its source is questionable, it shall be tested to confirm that it meets minimum chemical and mechanical requirements. One set of tension and bend tests shall be made for each 5 tons, or fractional part thereof, for each size to be used.
5. Automatic End Welded Studs: In accordance with CBC Section 2213A.2.

1.07 WOOD (Refer to Section 06 10 00 "Rough Carpentry")

- A. Lumber and Plywood (Refer to Section 06 10 00 "Rough Carpentry"):
 1. Installation of Timber Connectors shall be continuously inspected per 2022 California Building Code, Section 1705A.5.6.
- B. Manufactured Wood Chord Joists (Refer to Section 06 17 00 "Engineered Wood Products"):
 1. Continuous inspection during fabrication shall be provided per 2022 California Building Code, Section 1705A.5.5.
- C. Glue-Laminated Members (Refer to Section 06 18 00 "Glue Laminated Construction"):
 1. Continuous inspection during fabrication shall be provided per 2022 California Building Code, Section 1705A.5.4.

**QUICK REFERENCE GUIDE FOR TESTS AND INSPECTIONS
(AS APPLICABLE)**

TITLE 24, PART 2 (2022 CBC) - VOLUME 2
TESTS AND INSPECTIONS REQUIREMENTS

A. SOILS AND FOUNDATIONS (CHAPTER 18A):

- 1. Inspection:
 - a. Piles 1810A.3.1.4
- 2. Quality:
 - a. Compaction Control Testing of Earth Fill 3301.1, 1704A.7, 1803A
 - b. Soils 1705A.6

B. CONCRETE (CHAPTER 19A):

- 1. Materials:
 - a. Portland Cement 1705A.3.2, 1903A.1
 - b. Concrete Aggregates 1903A.5
 - c. Shotcrete Aggregates 1908A.2
 - d. Reinforcing Bars 1705A.3.2, 1910A.2
 - e. Pre-stressing Steel and Anchorage 1705A.3.4, 1910A.3
- 2. Quality:
 - a. Proportions of Concrete ACI 318, 1905A
 - b. Strength Tests of Concrete 1913A.4
 - c. Splitting Tensile Tests
 - d. Shotcrete Proportions 1908A.2
 - e. Shotcrete Cores 1908A.10
 - f. Composite Construction Cores 1910A.4
- 3. Inspection:
 - a. Jobsite 1705A.3, Table 1705A.3
 - b. Batch Plant 1705A.3.3
 - c. Waiver of Batch Plant 1705A.3.3.1
 - d. Pre-stressed Concrete 1704A.3.4
 - e. Reinforcing Bar Welding 1705A.3.1, AWS D1.4
 - f. Reinforcing Bar Placement 1705A.3.5
 - g. Post-Install Anchors in Concrete 1910A.5
 - h. Shotcrete 1908A.2
 - i. Concrete Preplacement 1705A.3.5

C. ALUMINUM (CHAPTER 20):

- 1. Materials:
 - a. Alloys 2002.1
 - b. Identification 2002.1
- 2. Inspection:
 - a. Welding 2003.1

D. MASONRY (CHAPTER 21A)

1. Materials:
 - a. Concrete Masonry Units 2103.A.1, 1705A.4
 - b. Portland Cement, Lime 2103A
 - c. Mortar and Grout Aggregates 2103A.2.2, 2013A.2.3
 - d. Reinforcing Bars 1705A.3.2
 - e. Clay Masonry Units 2103A.1
2. Quality:
 - a. Portland Cement Tests 1903A.1
 - b. Mortar and Grout Tests 2105A.3
 - c. Masonry Prism Tests 2105A.3
 - d. Masonry Core Tests 2105A.4
 - e. Masonry Unit Tests 2105A.2
 - f. Reinforcing Bar Tests 1910A.2
3. Inspection:
 - a. Reinforcing Masonry 1705A.4
 - b. Reinforcing Bar Welding 1705A.3.1, AWS D1.4

E. STEEL (CHAPTER 22A)

1. Materials:
 - a. Structural Steel 2205A.1
 - b. Cold Formed Steel 2210A.1
 - c. Identification 2203A.1
2. Quality:
 - a. Tests of Structural and Cold Formed Steel 1705A.2.1, Table 1705A.2.1
 - b. Tests of High Strength Bolts, Nuts, Washers 2213A.1, Table 1705A.2.1
 - c. Tests of End Welded Studs 2213A.2
 - d. Steel Joists 2207A.1, Table 1705A.2.3
 - e. Non-Destructive Weld Tests 1704A.2
3. Inspections:
 - a. Shop Fabrication 1704A.2.5
 - b. Welding 1704A.2.5
 - c. High Strength Bolt Installation Table 1705.A.2.1

F. WOOD (CHAPTER 23)

1. Materials:
 - a. Lumber and Plywood 2303.1.1
 - b. Glued Laminated Members 2303.1.3
2. Inspection:
 - a. Wood Structural Elements and Assemblies 1705A.5.4
 - b. Glued Laminated Fabrication 1705A.5.4, 2303.1.3
 - c. Timber Connectors 1705A.5.7
 - d. Manufactured Open Web Trusses 1705A.6, 2303.4

G. ROOF AND ROOF STRUCTURES (CHAPTER 15)

1. Materials:

- a. Roof Clay and Concrete Tiles

H. SAFEGUARDS DURING CONSTRUCTION (CHAPTER 33)

END OF SECTION 01 45 23

TEMPORARY FACILITIES AND CONTROLS

SECTION 01 50 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Temporary sanitary facilities.
 - 2. Security requirements.
 - 3. Waste removal facilities and services.
 - 4. Project identification sign.

1.02 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.
- B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

1.03 TEMPORARY UTILITIES

- A. Owner will provide the following:
 - 1. Electrical power and metering, consisting of connection to existing facilities.
 - 2. Water supply, consisting of connection to existing facilities.

1.04 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Use of existing facilities is not permitted.
- C. Maintain daily in clean and sanitary condition.
- D. Use of existing facilities is not permitted.

1.05 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Provide protection for plants designated to remain. Replace damaged plants.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.06 FENCING

- A. Provide 6-foot-high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.07 SECURITY

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

1.08 VEHICULAR ACCESS AND PARKING

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and Owner.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.09 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site periodically.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.10 PROJECT IDENTIFICATION

- A. Provide project identification sign of design and construction indicated on Drawings.
- B. Erect on site at location established by Architect.
- C. No other signs are allowed without Owner permission except those required by law.

1.11 FIELD OFFICES

- A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.
- B. Provide space for Project meetings, with table and chairs to accommodate six (6) persons.
- C. Provide separate private office similarly equipped and furnished, for use by Owner Project Inspector.
- D. Locate offices a minimum distance of 30 feet from existing and new structures.

1.12 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities and materials prior to Final Application for Payment inspection.
- B. Remove underground installations to a minimum depth of 2 feet. Contractor shall grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition.
- E. Restore new permanent facilities used during construction to a specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 50 00

**PRODUCT REQUIREMENTS
SECTION 01 60 00**

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1;
 - 2. General product requirements.
 - 3. Transportation, handling, storage and protection.
 - 4. Product option requirements.
 - 5. Substitution limitations.
 - 6. Maintenance materials, including extra materials, spare parts, tools, and software.
- B. Related Sections:
 - 1. Section 01 40 00: Quality Requirements
 - a. Product quality monitoring.

1.02 REFERENCE STANDARDS

- A. 16 CFR 260.13 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; Recycled Content; Current Edition.

1.03 SUBMITTALS

- A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. Submit within 35 days after date of Notice of Contract Award.
- C. For products specified only by reference standards, list applicable reference standards.
- D. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- E. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

F. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

1.04 QUALITY ASSURANCE

A. Manufacturer's Inventory of Product Content: Publicly available inventory of all ingredients identified by name and Chemical Abstract Service Registration Number (CAS RN).

B. For ingredients considered a trade secret or intellectual property, the name and CAS RN may be omitted, provided the ingredient's role, amount, and GreenScreen Benchmark are given.

C. Recycled Content: Determine percentage of post-consumer and pre-consumer (post-industrial) content separately, using the guidelines contained in 16 CFR 260.13.

D. Previously used, reused, refurbished, and salvaged products are not considered recycled.

E. Wood fabricated from timber abandoned in transit to original mill is considered reused, not recycled.

F. Determine percentage of recycled content of any item by dividing the weight of recycled content in the item by the total weight of all material in the item.

G. Determine value of recycled content of each item separately, by multiplying the content percentage by the value of the item.

H. Acceptable Evidence:

1. For percentage of recycled content, information from manufacturer.
2. For cost, Contractor's cost data.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.

B. DO NOT USE products having any of the following characteristics:

1. Made using or containing CFC's or HCFC's.
2. Containing lead, cadmium, asbestos.

2.02 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.03 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 TRANSPORTATION AND HANDLING

- A. Package products for shipment in a manner to prevent damage; for equipment, packaging to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on the outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.02 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- G. Comply with manufacturer's warranty conditions, if any.
- H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- I. Prevent contact with material that may cause corrosion, discoloration, or staining.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION 01 60 00

EXECUTION AND CLOSEOUT REQUIREMENTS

SECTION 01 70 00

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Examination, preparation, and general installation procedures.
2. Surveying for laying out the work.
3. Pre-installation meetings.
4. Cutting and patching.
5. Cleaning and protection.
6. Demonstration and instruction of Owner personnel.
7. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
8. General requirements for maintenance service.

B. Related Requirements

1. Section 01 11 00: Summary of Work:
 - a. Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
2. Section 01 30 00: Administrative Requirements
 - a. Submittals procedures, electronic document submittal service.
3. Section 01 40 00: Quality Requirements
4. Section 01 45 23: Tests and Inspections
 - a. Testing and inspection procedures.
5. Section 01 50 00: Temporary Facilities and Controls
 - a. Temporary exterior enclosures and interior partitions.
6. Section 01 79 00: Demonstration and Training
 - a. Demonstration of products and systems to be commissioned and where indicated in specific specification sections
7. Individual Product Specification Sections:
 - a. Advance notification to other sections of openings required in work of those sections.
 - b. Limitations on cutting structural members.

1.02 REFERENCE STANDARDS

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.**

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
 - 1. On request, submit documentation verifying accuracy of survey work.
 - 2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in conformance with Contract Documents.
 - 3. Submit surveys and survey logs for the project record.
- B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - a. Structural integrity of any element of Project.
 - b. Integrity of weather exposed or moisture resistant element.
 - c. Efficiency, maintenance, or safety of any operational element.
 - d. Visual qualities of sight exposed elements.
 - e. Work of Owner or separate Contractor.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 QUALIFICATIONS

- A. For survey work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.
- B. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State in which the Project is located.

1.05 PROJECT CONDITIONS

- A. Use of explosives is not permitted.
- B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
 2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- F. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
1. Minimize amount of bare soil exposed at one time.
 2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
 3. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- G. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
- H. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- I. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- J. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.06 COORDINATION

- A. See Section 01 11 00 "Summary of Work" for occupancy-related requirements.
- B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- C. Notify affected utility companies and comply with their requirements.
- D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel

with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

- F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- G. Coordinate completion and clean-up of work of separate sections.
- H. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 "Product Requirements".

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After

uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect four (4) days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation, and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Owner will locate and protect survey control and reference points.
- D. Control datum for survey is that indicated on drawings.
- E. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- F. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

- G. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- H. Utilize recognized engineering survey practices.
- I. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes and invert elevations.
 - 2. Grid or axis for structures.
 - 3. Building foundation, column locations and ground floor elevations.
- J. Periodically verify layouts by same means.
- K. Maintain a complete and accurate log of control and survey work as it progresses.
- L. On completion of foundation walls and major site improvements, prepare a certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.

3.05 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.

4. Match work that has been cut to adjacent work.
 5. Repair areas adjacent to cuts to required condition.
 6. Repair new work damaged by subsequent work.
 7. Remove samples of installed work for testing when requested.
 8. Remove and replace defective and non-conforming work.
- C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- F. Restore work with new products in accordance with requirements of Contract Documents.
- G. Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, "Firestopping" to full thickness of the penetrated element.
- I. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 2. Match color, texture, and appearance.
 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.07 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition throughout the project.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.

- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.08 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.09 DEMONSTRATION AND INSTRUCTION

- A. See Section 01 79 00 "Demonstration and Training".

3.10 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.11 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
 - 1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
- B. Use cleaning materials that are nonhazardous.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Clean filters of operating equipment.
- G. Clean debris from roofs, gutters, downspouts, and drainage systems.
- H. Clean site: sweep paved areas, rake clean landscaped surfaces.
- I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.12 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
 - 1. Provide copies to Architect and Owner.
- B. Make submittals (samples at the end of the Section) for close-out as follows:
 - 1. Record drawings and specifications.
 - 2. Operation and Maintenance (O&M) manuals.
 - 3. Bacteriological Test Report Certification
 - 4. Air Balance Report
 - 5. Extra Materials Stock
- C. Accompany Architect and Project Inspector on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's comprehensive list of items to be completed or corrected.
- D. Notify Architect when work is considered ready for Architect's Final Construction Compliance Inspection.
- E. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Notice of Completion inspection.
- F. Owner will occupy portions of the building as specified in Section 01 11 00 "Summary of Work".
- G. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

- I. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- J. Notify Architect when work is considered finally complete and ready for Architect's Construction Compliance final inspection.

3.13 MAINTENANCE

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Notice of Completion or the length of the specified warranty, whichever is longer.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION 01 70 00

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

SECTION 01 74 00

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Waste Management Requirements:

- a. California Green Building Standards Code 2022 (Title 24, Part 11), Section 5.408.1 requires this project recycle and/or salvage for reuse a minimum of 65% of the non-hazardous construction and demolition waste and demolition waste.
- b. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- c. Required Recycling, Salvage and Reuse: The following **may not be disposed** of in landfills or by incineration:
 - 1) Aluminum and plastic beverage containers.
 - 2) Corrugated cardboard.
 - 3) Wood pallets.
 - 4) Clean dimensional wood: May be used as blocking or furring.
 - 5) Land clearing debris, including brush, branches, logs, and stumps.
 - 6) Concrete: May be crushed and used as riprap, aggregate, sub-base material or fill if acceptable to the Soils Engineer.
 - 7) Bricks: May be used on project if whole, or crushed and used as landscape cover, sub-base material, or fill.
 - 8) Concrete masonry units: May be used for erosion control or landscape features.
 - 9) Precast concrete panels: May be used for erosion control or landscape features.
 - 10) Asphalt paving: May be recycled into paving for project.
 - 11) Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
 - 12) Glass.
 - 13) Gypsum drywall and plaster.
 - 14) Plastic buckets.
 - 15) Carpet, carpet cushion, carpet tile, and carpet remnants, both new and removed: DuPont (<http://flooring.dupont.com>) and Interface (www.interfaceinc.com) conduct reclamation programs.
 - 16) Asphalt roofing shingles.
 - 17) Paint.
 - 18) Plastic sheeting.

- 19) Rigid foam insulation.
- 20) Windows, doors, and door hardware.
- 21) Plumbing fixtures.
- 22) Mechanical and electrical equipment.
- 23) Fluorescent lamps (light bulbs).
- 24) Acoustical ceiling tile and panels.
- d. Certification for this project is dependent on diversion of 65 %, by weight, of potential landfill trash/waste by recycling and/or salvage.
- e. The following recycling incentive programs are mandatory for this project: Contractor is responsible for implementation:
 - 1) _____: Revenue or savings accrue to Contractor.
 - 2) _____: Rebates and credits must be applied for by Owner and shall accrue to Owner.
- f. Owner has decided for salvage of the following materials by others:
 - 1) _____: Recipient will provide containers and pick up.
 - 2) _____: Contractor shall deliver to recipient's location at _____ weekly.
- g. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.
- h. The following sources may be useful in developing the Waste Management Plan:
 - 1) State Recycling Department, at _____.
 - 2) Recycling Haulers and Markets: The attached list contains local haulers and markets for recyclable materials. This list is provided for information only and is not necessarily comprehensive; other haulers and markets are acceptable.
 - 3) Recycling Economics Information: The attached list contains information that may be useful in estimating the costs or savings or recycling options.
- i. Methods of trash/waste disposal that **are not acceptable** are:
 - 1) Burning on the project site.
 - 2) Burying on the project site.
 - 3) Dumping or burying on other property, public or private.
 - 4) Other illegal dumping or burying.
 - 5) Incineration, either on- or off-site.
- j. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state, and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

B. Related Sections:

- 1. Section 01 11 00 Summary of Work
 - a. List of items to be salvaged from the existing building for relocation in project or for Owner.

2. Section 01 30 00 Administrative Requirements
 - a. Additional requirements for project meetings, reports, submittal procedures, and project documentation.
3. Section 01 50 00 Temporary Facilities and Controls
 - a. Additional requirements related to trash/waste collection and removal facilities and services.
4. Section 01 60 00 Product Requirements
 - a. Waste prevention requirements related to delivery, storage, and handling.
5. Section 01 70 00 Execution and Closeout Requirements
 - a. Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.
6. Section 31 10 00 Site Clearing
 - a. Handling and disposal of land clearing debris.

1.02 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically include building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair, and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove any waste material from the project site to another site or remanufacture it into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating, and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.
- J. Reuse: To reuse construction waste material in some manner on the project site.

- K. Salvage: To remove waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements", for submittal procedures.
- B. Waste Management Plan: Include the following information:
 - 1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
 - 2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of the applicable landfill tipping fee(s).
 - 3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
 - 4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
 - 5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
 - 6. Transportation: Identify the destination and means of transportation of materials to be recycled, i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.
 - 7. Recycling Incentives: Describe procedures required to obtain credits, rebates, or similar incentives.

8. Recycling Incentive Programs:
 - a. Where revenue accrues to Contractor, submit copies of documentation required to qualify for incentive.
 - b. Where revenue accrues to Owner, submit any additional documentation required by Owner in addition to information provided in periodic Waste Disposal Report.

END OF SECTION 01 74 00

DEMONSTRATION AND TRAINING

SECTION 01 79 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.
 - 2. Training of Owner personnel in operation and maintenance is required for:
 - a. All software-operated systems.
 - b. HVAC systems and equipment.
 - c. Plumbing equipment.
 - d. Electrical systems and equipment.
 - e. Items specified in individual product Sections.
 - 3. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
 - a. Roofing and other weather-exposed or moisture protection products.
 - b. Finishes, including flooring, wall finishes, ceiling finishes.
 - c. Fixtures and fittings.
 - d. Items specified in individual product Sections.
- B. Related Sections:
 - 1. Section 01 70 00 Execution and Closeout Requirements
 - 2. Other Specification Sections: Additional requirements for demonstration and training.

1.02 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements", for submittal procedures; except:
 - 1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority.
 - 2. Submit one copy to the Commissioning Authority, not to be returned.
 - 3. Make commissioning submittals on time schedule specified by Commissioning Authority.
 - 4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of overall Training Plan; submit in editable electronic format, Microsoft Word 2010 preferred.
- B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
 - 1. Submit to Architect for transmittal to Owner.
 - 2. Submit to Commissioning Authority for review and inclusion in overall training plan.

3. Submit not less than four weeks prior to start of training.
 4. Revise and resubmit until acceptable.
 5. Provide an overall schedule showing all training sessions.
 6. Include at least the following for each training session:
 - a. Identification, date, time, and duration.
 - b. Description of products and/or systems to be covered.
 - c. Name of firm and person conducting training; include qualifications.
 - d. Intended audience, such as job description.
 - e. Objectives of training and suggested methods of ensuring adequate training.
 - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
 - g. Media to be used, such as slides, hand-outs, etc.
 - h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.
- C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
1. Include applicable portion of O&M manuals.
 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
 3. Provide one extra copy of each training manual to be included with operation and maintenance data.
- D. Training Reports:
1. Identification of each training session, date, time, and duration.
 2. Sign-in sheet showing names and job titles of attendees.
 3. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in original training session.
 4. Include Commissioning Authority's formal acceptance of training session.

1.03 QUALITY ASSURANCE

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION – GENERAL

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. Demonstrations conducted during Functional Testing need not be repeated unless an Owner personnel training is specified.
- C. Demonstration may be combined with Owner personnel training if applicable.
- D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
 - 1. Perform demonstrations not less than two weeks prior to Notice of Completion.
 - 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
 - 1. Perform demonstrations not less than two weeks prior to Notice of Completion.

3.02 TRAINING – GENERAL

- A. Commissioning Authority will prepare the Training Plan based on draft plans submitted.
- B. Conduct training on-site unless otherwise indicated.
- C. Owner will provide classroom and seating at no cost to Contractor.
- D. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.
- E. Provide training in minimum two-hour segments.
- F. The Commissioning Authority is responsible for determining that the training was satisfactorily completed and will provide approval forms.
- G. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
 - 1. The location of the O&M manuals and procedures for use and preservation; backup copies.

2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
 3. Typical uses of the O&M manuals.
- H. Product- and System-Specific Training:
1. Review the applicable O&M manuals.
 2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
 3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
 4. Provide hands-on training on all operational modes possible and preventive maintenance.
 5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
 6. Discuss common troubleshooting problems and solutions.
 7. Discuss any peculiarities of equipment installation or operation.
 8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
 9. Review recommended tools and spare parts inventory suggestions of manufacturers.
 10. Review spare parts and tools required to be furnished by Contractor.
 11. Review spare parts suppliers and sources and procurement procedures.
- I. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION 01 79 00

**SELECTIVE SITE DEMOLITION
SECTION 02 41 13**

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1
2. Site Demolition
 - a. Removal of all trees, buildings, and structures to clear site.
3. Back filling and site restoration.
4. Protection of trees and other landscape material not slated for removal.
5. Disposal of rubbish and debris offsite.
6. Asbestos abatement.
7. Coordination of salvage material with Owner.
8. Reuse and recycling.
9. Barricades, signs, protective structures, and devices.
10. Clean-up

B. Related Sections:

- | | |
|---------------------|--|
| 1. Section 01 74 00 | Construction Waste Management and Disposal |
| 2. Section 31 10 00 | Site Clearing |
| 3. Section 31 22 00 | Earthwork |

C. Work by Owner:

1. Items noted "NIC" (Not in Contract) including, but not limited to, asbestos and contaminated soil abatement, will be provided by separate Contractor.
 - a. Asbestos Abatement:
 - 1) All asbestos abatement will be performed prior to the start of demolition of this Section.
 - a) Asbestos abatement will be performed by separate Contractor and will be performed as indicated.
 - b. Contaminated Soil Abatement:
 - 1) Contaminated soil abatement will be performed by a separate Contractor. Coordinate demolition work with contaminated Soil Abatement Contractor.

1.02 SUBMITTALS

A. Record Drawings:

1. Keep a record of the location and size of all capped pipes and/or conduit.
2. Submit record drawings per General Conditions.

1.03 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Work shall comply with applicable provisions of local and State safety and health ordinances.
 - a. Prior to the start of any demolition, the County of Kern Environmental Health Services Department and Basic Compliance Engineering shall be given 48-hour notice by the Contractor.
 - 2. Take out and maintain required permits, approvals, and licenses necessary to legally complete this work.
 - 3. Ensure that subcontractors are properly licensed and have the required permits to perform their work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine the demolition site to determine the extent of the work included in this Contract.
- B. Accept the premises in the condition as found on the first day of work under this Contract.

3.02 PREPARATION

- A. Notify utility companies concerning cut-off or restoration of service, or of relocation or modification of any such service that the work of this contract may require.
- B. Protect and maintain in operation utility or sewer line that is required to remain operative during the period of this contract.

3.03 INSTALLATION OR APPLICATION

- A. Furnish and maintain temporary construction, scaffolding, ladders, runways, hoists, etc.
- B. Maintain a clean and safe work area, and all other affected premises.

- C. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning handling and protection against exposure or environmental pollution.
 - 1. Notify Architect immediately upon encountering hazardous materials.

3.04 PROTECTION OR ADJUSTMENTS

- A. Enclose area of work with fence barricades.
- B. The work area shall be kept securely locked at all times work is in progress.
- C. Post signs and warning devices are necessary to exclude all persons, except those directly connected with the work from work areas.
- D. Protect adjacent buildings, shrubs, trees, and lawns from damage.
- E. Do not interfere with use of adjacent buildings or safe ingress or egress.
- F. Use of explosives will not be permitted.

3.05 CLEANING OR REPAIR

- A. Debris resulting from the work of this Section shall be removed and hauled away from the site.
 - 1. Debris and rubbish shall not be allowed to accumulate on the site.
- B. All material generated by this work shall be disposed of properly outside the project limits, in accordance with all applicable regulations, laws and ordinances.
 - 1. Sprinkle loose material while being stored, handled, or loaded.
- C. Do not burn rubbish at the site.

3.06 CONDITION OF FINISHED WORK

- A. Trees and shrubs, where indicated, shall be removed along with their roots, stumps, etc.
- B. Protections, tools, materials, plant apparatus, and rubbish or debris shall be removed.
- C. Existing areas to remain, public or private property, that may have been damaged, made dirty, or otherwise disorderly as a result of his work shall be restored to good order.

3.07 SALVAGE

- A. The Owner reserves the right to retain ownership of any equipment or fixtures removed from the property.
 - 1. Removed equipment and fixtures shall be stored neatly in an area designated by the Owner for a period of 48 hours.
 - a. Place in neat piles or stacks.
 - 2. Items that are not claimed by the Owner within the 48-hour time period shall be removed from the site and properly disposed of.
 - 3. Improvements or materials removed from the building shall not be transferred by sale, gift, or in any manner whatsoever to the public.
 - a. Sale or disposal to duly licensed contractors or materialmen is permitted.
 - b. Contractor shall assume all responsibilities arising out of such operation.
- B. Items indicated to be removed, but of salvageable value to the Contractor, may be removed from structure as work progresses.
 - 1. Transport salvaged items from site as they are removed. Storage of removed items onsite will not be permitted.
 - 2. Items or materials removed from the building shall not be transferred by sale, gift, or in any manner whatsoever to the public.
 - a. Sale or disposal to duly licensed contractors or materialmen is permitted.
 - b. Contractor shall assume all responsibilities arising out of such operation.

3.08 RECYCLING AND REUSE

- A. Construction Waste Management Plan (Refer to Section 01 74 00 "Construction Waste Management and Disposal"):
 - 1. Where the local jurisdiction does not have a construction and demolition waste management ordinance that is more stringent, submit a construction waste management plan that:
 - a. Identifies the construction waste materials to be diverted from disposal by efficient usage, recycling, reuse on the project or salvage for future use or sale.
 - b. Determines if construction waste materials will be sorted on-site (source separate) or bulk mixed (single stream).
 - c. Determines if construction waste materials will be sorted on-site (source separate) or bulk mixed (single stream).
 - d. Determines if construction waste materials will be sorted on-site (source separate) or bulk mixed (single stream).
 - e. Construction Waste Management Plan:

- B. Where the local jurisdiction does have a construction and demolition waste management ordinance that is more stringent, submit a construction waste management plan that:
1. Utilize a Waste Management Company that can provide verifiable documentation that the percentage of construction waste material diverted from the landfill complies with this section.
 - a. 65% of construction waste shall be recycled or salvaged and diverted from the landfills per 2022 California Green Building Code, Title 24, Part 11, Section 5.408.

END OF SECTION 02 41 13

SELECTIVE BUILDING DEMOLITION

02 41 19

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1
2. Selective Demolition:
 - a. Extent of building demolition work as indicated on Drawings.
3. Back filling and building restoration.
4. Disposal of rubbish and debris offsite.
5. Barricades, signs, protective structures, and devices.
6. Clean up.

B. Related Sections:

- | | |
|---------------------|--|
| 1. Section 01 74 00 | Construction Waste Management and Disposal |
| 2. Section 02 41 13 | Selective Site Demolition |

1.02 SUBMITTALS

A. Record Drawings:

1. Keep a record of the location and size of all capped pipes and/or conduit.
2. Submit record drawings per General Conditions.

1.03 QUALITY ASSURANCE

A. Regulatory Compliance:

1. Work shall comply with applicable provisions of local and State safety and health ordinances.
 - a. Prior to start of any demolition, the County of Kern Environmental Health Services Department and Basic Compliance Engineering shall be given 48-hour notice by the Contractor.
2. Take out and maintain required permits, approvals, and licenses necessary to legally complete this work.
3. Ensure that subcontractors are properly licensed and have required permits to perform their work.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine the building(s) to determine the extent of the work included in this Contract.
- B. Accept the premises in the condition as found on the first day of work under this Contract.

3.02 PREPARATION

- A. Notify utility companies concerning cut off or restoration of service or of relocation or modification of any such service that the work of this contract may require.
- B. Protect and maintain in operation utility or sewer lines that are required to remain operative during the period of this contract.

3.03 INSTALLATION OR APPLICATION

- A. Furnish and maintain temporary construction, scaffolding, ladders, runways, hoists, etc.
- B. Maintain a clean and safe work area, and all other affected premises.
- C. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning handling and protection against exposure or environmental pollution.
 - 1. Notify Architect immediately upon encountering hazardous materials.

3.04 PROTECTION OR ADJUSTMENTS

- A. Enclose area of work with fence barricades.
- B. The working area shall be kept securely locked at all times work is in progress.
- C. Post signs and warning devices necessary to exclude all persons, except those directly connected with the work from work areas.
- D. Protect adjacent buildings, shrubs, trees, and lawns from damage.
- E. Do not interfere with use of adjacent buildings, or safe ingress or egress.
- F. Use of explosives will not be permitted.

3.05 CLEANING OR REPAIR

- A. Debris resulting from the work of this Section shall be removed and hauled away from the site.
 - 1. Debris and rubbish shall not be allowed to accumulate on the site.
- B. All material generated by this work shall be disposed of properly outside the project limits in accordance with all applicable regulations, laws, and ordinances. Sprinkle loose material while being stored, handled, or loaded.
- C. Burning of removed materials is not permitted within the project limits.

3.06 CONDITIONS OF FINISHED WORK

- A. Protections, tools, materials, plant apparatus, and rubbish or debris shall be removed. Sprinkle loose material while being stored, handled, or loaded.
- B. Existing areas to remain, public or private property, that may have been damaged, made dirty, or otherwise disorderly as a result of this work shall be restored to good order.
- C. Glue residue from removal of floor coverings, wall coverings, tackboard panels, wall accessories, ceiling tiles, or similar components, shall be scraped down, mechanically or by hand, to remove bumps or un-level surfaces to a condition that normal preparation and patching by subsequent trades is within normal trade standards.

3.07 SALVAGE

- A. Unless noted otherwise, all salvageable items determined to be of value, including, but not limited to, casework, stainless steel, toilet accessories, toilet partitions, copper wiring, plumbing fixtures, mechanical equipment, copper wiring, lighting fixtures, structural steel, shall be carefully removed, cleaned, and stored in the staging area. Notify the Owner representative in writing that there are salvageable items for their review. If, after 72 hours of receipt of notification, the items have not been removed, the Contractor shall legally dispose of them. The 72-hour time period does not include weekends or holidays and shall start upon Owner's receipt of written notice.
- B. The Owner shall be able to examine and remove any of the items salvaged from the project. It is the Contractor's responsibility to protect the salvaged items during the 72-hour period. Should any of the salvaged items be disposed before the Owner has examined them, the Contractor shall reimburse the Owner for these items.

- C. The Owner reserves the right to retain ownership of any equipment, fixtures, or materials removed from the property.
 - 1. Removed equipment and fixtures shall be stored neatly in an area designated by the Owner for a period of 72 weekday hours.
 - 2. Items that are not claimed by the Owner within the 72-hour time period shall be removed from the site and properly disposed of.
 - 3. Improvements or materials removed from the building shall not be transferred by sale, gift, or in any manner whatsoever to the public.
 - a. Sale or disposal to duly licensed contractors or materialmen is permitted.
 - b. Contractor shall assume all responsibilities arising out of such operation.
- D. Items indicated to be removed, but of salvageable value to the Contractor may be removed from structure as work progresses.
 - 1. Transport salvaged items from site as they are removed. Storage of removed items onsite will not be permitted.
 - 2. Items or materials removed from the building shall not be transferred by sale, gift, or in any manner whatsoever to the public.
 - a. Sale or disposal to duly licensed contractors or materialmen is permitted.
 - b. Contractor shall assume all responsibilities arising out of such operation.

END OF SECTION 02 41 19

CONCRETE FORMING SECTION 03 11 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1
 - 2. Formwork for cast-in place concrete, including shoring, bracing and anchorage.
 - 3. Openings for other work
 - 4. Form accessories.
 - 5. Form stripping.
 - 6. Clean up.
- B. Related Sections:
 - 1. Section 03 21 00 Reinforcing Steel
 - 2. Section 03 31 00 Structural Concrete Work
 - 3. Section 03 35 00 Concrete Sealing, Hardening and Finishes

1.02 REFERENCES

- A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary; American Concrete Institute International.
- C. ACI 347R - Guide to Formwork for Concrete; American Concrete Institute International.
- D. PS 1 - Construction and Industrial Plywood; National Institute of Standards and Technology (Department of Commerce).

1.03 DESIGN REQUIREMENTS

- A. The contractor is responsible for the design, engineer and construct formwork, shoring, reshoring, and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line, and dimension. Engineering design work to be completed by a professional engineer licensed in the state in which the project is located.
- B. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete. Design work to be completed by a professional engineer licensed in the state in which the project is located.

1.04 SUBMITTALS

- A. Refer to Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data: Provide data on void form materials and installation requirements.
- C. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties. Shop drawings to be reviewed by the professional engineer responsible for the design of the formwork and submitted to the Contractor for record.
- D. Openings and Blockouts: Shop drawings shall indicate the exact size and locations of only the slab edges of all openings, blockouts, sleeves and penetrations in structural elements only for review.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 347R, ACI 301, and ACI 318.
- B. Design formwork under direct supervision of a Professional Engineer experienced in design of concrete formwork and licensed in the state in which the project is located.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for design, fabrication, erection, and removal of formwork.

1.07 AIR QUALITY REQUIREMENTS

- A. Comply with the requirements of Section 01 41 00 "Regulatory Requirements" as they are applicable to the work of this section, and as though they are repeated verbatim herein.

1.08 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver form materials and installation instructions in manufacturer's packaging.
- B. Store forms off ground in ventilated and protected manner to prevent deterioration from moisture or damage.

PART 2 PRODUCTS

2.01 WOOD FORM MATERIALS

- A. Form Materials: At the discretion of the Contractor to achieve design requirements and specified finishes.

- B. Softwood Plywood: PS 1, B-B High Density Concrete Form Overlay, Class I.
- C. Plywood: Douglas Fir species; solid one side grade; sound undamaged sheets with clean, true edges.
- D. Lumber: Douglas Fir species; structural grade; with grade stamp clearly visible.

2.02 PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum 16 gage well matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished surfaces.
- B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished concrete surfaces.
- C. Pan Type: Steel, glass fiber, removable of size and profile required.
- D. Tubular Column Type: Round, spirally wound laminated fiber wood, or glass fiber material, surface treated with release agent, of sizes required.
- E. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set.

2.03 FORMWORK ACCESSORIES

- A. Form Ties: Removable or snap-off type, galvanized metal, fixed or adjustable length, cone type, with waterproofing washer, 1 inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete surface.
- B. Form Release Agent: Colorless material that will not stain concrete, absorb moisture, impair natural bonding of concrete finish coatings, or affect color characteristics of concrete finish coatings.
- C. Corners: Chamfered, wood strip type; maximum possible lengths.
- D. Dovetail Anchor Slot: Galvanized steel, minimum 14 gage thick, foam filled, release tape sealed slots, anchors for securing concrete formwork.
- E. Flashing Reglets: Galvanized steel, 16 gage thick, longest possible lengths, with alignment splines for joints, foam filled, release tape sealed slots, anchors for securing to concrete formwork.
- F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

G. Waterstops: Polyethylene, minimum 2,000 psi tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, six inch (6") wide, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

1. Greenstreak PVC Waterstops as manufactured by Sitka Corporation.

H. Waterstops: Preformed mineral colloid strips, 3/8 inch thick, moisture expanding.

PART 3 EXECUTION

3.01 EXAMINATION

A. Contractor shall verify lines, levels, and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

A. Earth forms may be permitted only where specifically allowed in the Geotechnical report.

B. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

C. Where earth forms are used, increase the sizes of structural elements shown in the drawings by a minimum of three inches.

3.03 ERECTION – FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

D. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping.

E. Align joints and make watertight. Keep form joints to a minimum.

F. Obtain approval before framing openings in structural members that are not indicated on drawings.

G. Provide filler and chamfer strips on external corners of beams, joists, columns, and walls where shown on architectural drawings.

- H. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.
- I. Coordinate this section with other sections of work that require attachment of components to formwork.

3.04 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in or passing through concrete work.
- B. Locate and set in place items that will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
- D. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Install waterstops in accordance with manufacturer's instructions, so they are continuous without displacing reinforcement. Heat seal joints so they are watertight.
- F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- G. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.06 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.

- B. Clean formed cavities of debris prior to placing concrete.
 - 1. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
 - 2. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.07 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301.
- B. Construct and align formwork for elevator hoistway in accordance with ASME A17.1.
- C. Camber slabs and beams in accordance with structural drawings requirements.

3.08 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 45 23 "Tests and Inspections".
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

3.09 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads as determined by the engineer responsible for the formwork design.
- B. Remove formwork and reshore structural members as directed by the engineer responsible for the formwork design to permit successive construction.
- C. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- D. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.
- E. Remove formwork in such a sequence as to achieve similar concrete surface coloration.

END OF SECTION 03 11 00

REINFORCING STEEL SECTION 03 21 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Reinforcing steel for cast-in-place concrete and concrete masonry units.
 - 2. Supports and accessories for steel reinforcement.
- B. Related Sections
 - 1. Section 03 11 00: Concrete Forming.
 - 2. Section 03 31 00: Structural Concrete Work.
 - 3. Section 04 24 00: Concrete Unit Masonry Units

1.02 REFERENCES

- A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete and Commentary; American Concrete Institute International.
- C. ASTM A 82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
- D. ASTM A 184/A 184M - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement.
- E. ASTM A 185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- F. ASTM A 497/A 497M - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
- G. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- H. ASTM A 704/A 704M - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.

- I. ASTM A 706/A 706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
- J. ASTM A 996/A 996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
- K. AWS D1.4 - Structural Welding Code - Reinforcing Steel; American Welding Society.
- L. CRSI (DA4) - Manual of Standard Practice; Concrete Reinforcing Steel Institute.
- M. CRSI (P1) - Placing Reinforcing Bars; Concrete Reinforcing Steel Institute.

1.03 SUBMITTALS

- A. Shop Drawings: Only when deviations are made from the contract documents, submit shop drawings under provision of Section 01 31 00 "Project Management and Coordination" with deviations clearly identified.
 - 1. Indicate sizes, spacings, locations and quantities of reinforcing steel, wire fabric, bending and cutting schedules, splicing, stirrup spacing, supporting and spacing devices.
- B. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.
- C. Reports: Submit certified copies of mill test report of reinforcement materials analysis, indicate physical and chemical analysis.
- D. Welders Certificates: Submit certifications for welders employed on the project, verifying AWS qualifications with the previous 12 months.

1.04 QUALITY ASSURANCE

- A. Perform work of this section in accordance with CRSI (DA4), CRSI (P1), ACI 301, and ACI SP-66.

1.05 AIR QUALITY REQUIREMENTS

- A. Comply with the requirements of Section 01 41 00 "Regulatory Requirements" as they are applicable to the work of this section, and as though they are repeated verbatim herein.

PART 2 PRODUCTS

2.01 REINFORCEMENT

- A. Reinforcing Steel: ASTM A 615/A 615M Grade 60.
 - 1. Deformed billet-steel bars.
 - 2. Unfinished.
- B. Reinforcing Steel: ASTM A 706/A 706M, deformed low-alloy steel bars.
 - 1. Deformed billet-steel bars.
 - 2. Unfinished.
- C. Steel Welded Wire Reinforcement: ASTM A185/A 185M, plain type.
 - 1. Welded Wire Mat Reinforcing: mesh size and gage as indicated on drawings.
- D. Steel Welded Wire Reinforcement: ASTM A 497, deformed type.
 - 1. Flat Sheets.
 - 2. Mesh Size and Wire Gage: As indicated on drawings.
- E. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage acceptable patented system.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement, including load bearing pad on bottom to prevent vapor barrier puncture.
 - 3. Provide stainless steel, plastic, or plastic coated steel components for placement within 1½" of weathering surfaces.

2.02 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.
- B. Welding of reinforcement is permitted only with the specific approval of Structural Engineer. Perform welding in accordance with AWS D1.4.
- C. Obtain approval from the architect for additional reinforcing splices not indicated on drawings.

PART 3 EXECUTION

3.01 PLACEMENT

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

- B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.
 - 1. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.
 - 2. Do not displace or damage vapor barrier.
 - 3. Accommodate placement of formed openings.
 - 4. Bond and ground reinforcement to requirements of [Section 26 05 26](#) "Grounding and Bonding for Electrical Systems".

3.02 FIELD QUALITY CONTROL

- A. An independent testing agency, as specified in Section 01 45 23 "Tests and Inspections", will inspect installed reinforcement for conformance to contract documents before concrete placement.

END OF SECTION 03 21 00

STRUCTURAL CONCRETE WORK

SECTION 03 31 00

PART 1 GENERAL

1.01 SUMMARY:

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1
2. Structural concrete and slabs for buildings and structures
3. Footings for exterior concrete block walls
4. Under slab drainage and gravel beds
5. Under slab perforated vent piping
6. Under slab geotextile fabric where detailed
7. Placing of bolts, anchors, frames, inserts, etc.
8. Protection and patching of concrete
9. Concrete pits and slabs for plumbing, electrical, heating and ventilation inside of buildings or structures.
10. Submittal preparation and concrete mix designs
11. Superplasticizers and admixtures
12. Control and expansion joints
13. Clean-up.

B. Related Sections:

- | | |
|----------------------|---------------------------|
| 1. Section 03 11 00: | Concrete Forming |
| 2. Section 03 21 00: | Steel Reinforcing. |
| 3. Section 03 35 00: | Concrete Finishing. |
| 4. Section 07 26 00: | Under-slab Vapor Barrier. |
| 5. Section 07 92 00: | Joint Sealants. |
| 6. Section 32 13 13: | Site Concrete. |

1.02 REFERENCES

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International.
- B. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete; American Concrete Institute International
- C. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.
- D. ACI 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International.
- E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International.

- F. ACI 305R - Hot Weather Concreting; American Concrete Institute International.
- G. ACI 306R - Cold Weather Concreting; American Concrete Institute International.
- H. ACI 308R - Guide to Curing Concrete; American Concrete Institute International.
- I. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International.
- J. ASTM C 33 - Standard Specification for Concrete Aggregates.
- K. ASTM C 39/C 39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- L. ASTM C 94/C 94M - Standard Specification for Ready-Mixed Concrete.
- M. ASTM C 143/C 143M - Standard Test Method for Slump of Hydraulic-Cement Concrete.
- N. ASTM C 150 - Standard Specification for Portland Cement.
- O. ASTM C 173/C 173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
- P. ASTM C 260 - Standard Specification for Air-Entraining Admixtures for Concrete.
- Q. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- R. ASTM C 330 – Standard Specification for Lightweight Aggregates for Structural Concrete.
- S. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete.
- T. ASTM C 618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- U. ASTM C 685/C 685M – Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing.
- V. ASTM C 881/C 881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- W. ASTM C 1059 - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.

- X. ASTM C 1107/C 1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
- Y. ASTM E 1155 - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers.
- Z. ASTM E 1155M - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers [Metric].

1.03 DEFINITIONS

- A. Severe Exposure: Concrete which is in contact with moisture or deicing salts, such as pavements, sidewalks, parking garage floors, etc.
- B. Moderate Exposure: Concrete which is occasionally exposed to moisture, such as exterior walls, beams, girders, and slabs not in contact with soil, etc.

1.04 SUBMITTALS

- A. General: Submit in accordance with Section 01 31 00 "Project Management and Coordination".
- B. Shop Drawings: Submit drawings locating slab-on-grade construction joints, control joints, and isolation joints.
- C. Product Data: Submit product data for proprietary products.
- D. Samples:
 - 1. Provide 12 inch by 18 inch concrete sample of smooth rubbed [grout cleaned] [cork float] finishes showing final texture to be expected.
- E. Mix Designs:
 - 1. Submit proposed concrete mix designs for each class or use at least 30 days prior to required delivery.
 - 2. Mixes shall be prepared by a professional engineer licensed in the state in which the project is located.
 - 3. Specifically indicate where each class of concrete is to be used.
 - 4. Indicate individual and combined aggregate gradations and aggregate source and characteristics.
- F. Test Reports: Submit aggregate and concrete mix test reports from independent testing laboratory as required by Section 01 45 23 "Tests and Inspections".

1.05 QUALITY ASSURANCE

- A. Certifications:
 - 1. Submit material certification for admixtures and aggregates, certifying their compliance with specifications.
 - 2. Submit certified mill test reports for each lot of cement.

- B. Perform work of this section in accordance with ACI 301 and ACI 318.
- C. Acquire cement from same source and aggregate from same source for entire project.
- D. Follow recommendations of ACI 305R for concreting during hot weather.
- E. Follow recommendations of ACI 306R for concreting during cold weather.

1.06 PRE-INSTALLATION CONFERENCE

- A. Conduct pre-installation conference in accordance with Section 01 31 00 "Project Management and Coordination".

1.07 DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with requirements of Section 01 60 00 "Product Requirements".
- B. Deliver packaged products to site in manufacturer's sealed and labeled containers; inspect to verify compliance with specified requirements.
- C. Label containers to indicate manufacturer's name, product name, date of manufacture, and instructions for use.
- D. Store liquid materials in tightly covered containers in well ventilated area at ambient temperatures recommended by manufacturer. Store dry materials on raised platforms and cover to prevent moisture damage. Maintain containers in clean condition, free of foreign materials and residue with labels in legible condition.
- E. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.08 AIR QUALITY REQUIREMENTS

- A. Comply with the requirements of Section 01 41 00 "Regulatory Requirements" as they are applicable to the work of this section, and as though they are repeated verbatim therein.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Comply with the requirements of Section 03 11 00 "Concrete Forming".

2.02 REINFORCEMENT

- A. Comply with the requirements of Section 03 21 00 "Steel Reinforcing".

2.03 CONCRETE MATERIALS

A. Portland Cement:

1. ASTM C150, Type as indicated in the structural drawings.
2. Air-entraining portland cement, as defined by ASTM C150, is prohibited.
3. [Do not use Type III cement in lightweight structural concrete.]

B. Aggregate:

1. Coarse Aggregate:
 - a. ASTM C33 for normal weight aggregate.
 - b. ASTM C330 for lightweight aggregate.
2. Fine Aggregate: ASTM C33.
3. Exposed Aggregate: To match Architect's sample.

C. Water: Clean, fresh and potable.

D. Admixtures:

1. Calcium chloride, thiocyanates, or admixtures containing more than 0.05 percent chloride ions are not permitted unless approved by Architect.
2. Air Entraining: ASTM C260.
3. Water-reducing: ASTM C494, Type A.
4. High Range Water-reducing (Superplasticizer): ASTM C494, Type F or Type G.
5. Water-reducing, Non-corrosive, Non-chloride Accelerator:
 - a. ASTM C494, Type E.
 - b. Submit long term non-corrosive test data from independent testing laboratory using accelerated test method such as electrical potential measure.
6. Water-reducing, Retarding: ASTM C494, Type D.
7. Chemical Corrosion Inhibitor:
 - a. Calcium nitrite in liquid form.
 - b. Acceptable Product: DCI by Grace Construction Products, Cambridge, MA.

E. Synthetic Fibers:

1. Monofilament or fibrillated polypropylene fibers.
2. Acceptable Products:
 - a. Fiberstrand, Euclid Chemical Company, Cleveland, OH.
 - b. Fibermesh, Fibermesh, Chattanooga, TN.
 - c. Forta CR, Forta Corporation, Grove City, PA.

F. Bonding Admixture:

1. Acrylic or styrene butadiene, non-remulsifiable.
2. Acceptable Products:
 - a. Flex-Con or SBR Latex, Euclid Chemical Company, Cleveland, OH.
 - b. Everbond, L&M Construction Chemicals, Inc., Omaha, NE.
 - c. Acryl Set, Master Builders, Cleveland, OH.
 - d. Intralok, W. R. Meadows, Inc., Elgin IL.

G. Bonding Grout:

1. Mix consisting of portland cement, part fine sand passing No. 30 mesh sieve, bonding admixture, and water in proportions as recommended by bonding admixture manufacturer.
2. Minimum 1:1 cement to sand ratio.
3. Mix to achieve consistency of thick cream.

H. Membrane Vapor Barrier:

1. Comply with the requirements of Section 07 26 00 "Under Slab Vapor Barrier".

2.04 CONCRETE MATERIALS

A. Sheet Curing Materials: ASTM C171; white opaque polyethylene film, white polyethylene coated burlap sheeting, or regular waterproof paper.

B. Dissipating Resin Curing Compounds:

1. ASTM C309, Type 1 [1-D] clear or translucent [with fugitive dye] [Type 2 white pigmented at exterior locations], Class B, free of natural or petroleum waxes. Class A not acceptable.
2. Liquid, membrane forming, 100 percent resin based allowing maximum moisture loss in 72 hours of 0.11 lb/sq. ft.
3. Compatible with subsequent coatings and toppings.
4. Acceptable Products:
 - a. Kurex, Chem-Masters Corporation, Madison, OH.
 - b. Kurez DR, Euclid Chemical Company, Cleveland, OH.
 - c. L&M Cure DR, L&M Construction Chemicals, Inc., Omaha, NE.
 - d. 3100 Clear, W. R. Meadows, Inc., Elgin, IL.
 - e. ABCO 1309 Resin Cure, Nox-Crete Chemicals, Omaha, NE.
 - f. Kurez VOX, Euclid Chemical Co., Cleveland, OH.
 - g. L&M Cure R, L&M Construction Chemicals, Inc., Omaha, NE.
 - h. 1100 Clear, W.R. Meadows, Elgin, IL.

C. Acrylic Curing/Sealing Compounds:

1. ASTM C1315, Type I [I-D] clear or translucent [with fugitive dye] [Type II white pigmented at exterior locations], Class A [B] [C], free of natural or petroleum waxes.
2. Liquid, membrane forming, minimum 30 percent [12 percent] [22 percent] acrylic resin solids, allowing maximum moisture loss in 72 hours of 0.08 lb/sq. ft.
3. Compatible with subsequent coatings and toppings.
4. Acceptable Products:
 - a. Super Rez-Seal (31 percent) [Rez-Seal (14 percent)] [Eucocure (18 percent)], Euclid Chemical Company, Cleveland, OH.
 - b. Dress & Seal 30 [18] [Dress & Seal], L&M Construction Chemicals, Inc., Omaha, NE.

- c. Tiah (30 percent) [CS-309 (12 percent)], W. R. Meadows, Inc., Elgin, IL.
 - d. ABCO Cure & Seal 830 (30 percent) [309 (12 percent)] [800 (22 percent)], Nox-Crete Chemicals, Omaha, NE.
 - e. Cure & Seal 31 percent [14 percent] [18 percent], Symons Corporation, Des Plaines, IL.
- D. Water Based Acrylic Curing/Sealing Compounds:
- 1. ASTM C1315, Type I, Class A [B] [C], VOC compliant, free of natural or petroleum waxes. Dries clear with high [medium] gloss sheen.
 - 2. Liquid, membrane forming, minimum 30 percent [20 percent] acrylic resin solids, allowing maximum moisture loss in 72 hours of 0.08 lb/sq. ft.
 - 3. Acceptable Products:
 - a. Super Diamond Clear VOX, Euclid Chemical Company, Cleveland, OH.
 - b. Dress & Seal WB 30, L&M Construction Chemicals, Inc., Omaha, NE.
 - c. VOCOMP 30, W. R. Meadows, Inc., Elgin, IL.
- E. Chemical Curing Compounds:
- 1. Penetrating liquid, non-film forming, solution of sodium, potassium and meta silicate compounds.
 - 2. Compatible with subsequent coatings and toppings.
 - 3. Acceptable Products:
 - a. L&M Cure, L&M Construction Chemicals, Inc., Omaha, NE.
 - b. Eucosil, Euclid Chemical Company, Cleveland, OH.
 - c. Sonosil, Sonneborn Building Products, Shakopee, MN.
 - d. Dust-Gard, W. R. Meadows, Inc., Elgin, IL.

2.05 ACCESSORIES

- A. Crusher Run Fines fill under slabs shall conform to ASTM C33 for fine aggregate #10.
- B. Crushed Rock fill under slabs shall be 3/4" x #4 coarse aggregates.
- C. Construction joint waterstops shall be a 75% sodium bentonite and 25% butyl composite.
 - 1. Volclay #RX-102, 3/4" x 3/8" or equal. Use Volclay Setseal adhesive. All penetrations and slab to footing joints shall receive waterstop treatment.
- D. Membrane Vapor Barrier:
 - 1. Refer to Section 07 26 "Under-Slab Vapor Barrier" for the vapor barrier membrane.

2.06 PATCHING AND REPAIR MATERIALS

- A. Epoxy Adhesive:
 - 1. 100 percent solids, two component material suitable for use on dry or damp surfaces, conforming to ASTM C881.

2. Acceptable Products and Manufacturers:
 - a. Concrese Liquid LPL, Master Builders, Inc., Cleveland, OH.
 - b. Sikadur Hi-Mod 32, Sika Corporation, Lyndhurst, NJ.
 - c. Euco 452 or 620 System, Euclid Chemical Company, Cleveland, OH.
- B. Patching Compound:
 1. Polymer modified cementitious mortar.
 2. Acceptable Products and Manufacturers:
 - a. Thin Coat, Concrete Coat, or Verticoat, Euclid Chemical Company, Cleveland, OH.
 - b. Duratop, L&M Construction Chemicals, Inc., Omaha, NE.
 - c. Sikatop 121, 122, or 123, Sika Corporation, Lyndhurst, NJ.
- C. Patching Mortar:
 1. Comprised of same materials and approximately same proportions as used for surrounding concrete, except with coarse aggregate omitted.
 2. Consisting of not more than 1 part cement to 2-1/2 parts sand.
 3. Substitute white portland cement for portion of gray portland cement to match color of surrounding exposed concrete.
 4. Limit mixing water to no more than necessary for handling and placing. Maximum water/cement ratio of 0.50.
- D. Bonding Agent:
 1. Acrylic, ASTM C1059, Type II, Non redispersable.
 2. Acceptable Products and Manufacturers:
 - a. Everbond, L&M Construction Chemicals, Inc., Omaha, NE.
 - b. Daraweld-C, Grace Construction Products, Cambridge, MA.
 - c. Intralok, W. R. Meadows, Inc., Elgin IL.
- E. Evaporation Retardants:
 - a. Acceptable Products and Manufacturers:
 - 1) Eucofilm, Euclid Chemical Co., Cleveland, OH.
 - 2) E-Con, L&M Construction Chemicals, Inc., Omaha, NE.
 - 3) Confilm, Master Builders, Inc., Cleveland, OH.

2.07 CONCRETE MIXES

- A. Mix Design:
 1. Submit design mixes for each type and class of concrete based on laboratory trial batch method or field experience methods described in ACI-318, Chapter 5.
 2. If trial batch method is used, employ an independent testing agency acceptable to Architect for preparing and reporting proposed mix designs. Mix designs are to be prepared by a professional engineer licensed in the state in which the project is located.
 3. Contractor employed testing agency shall not be same firm as Owner employed testing agency.

4. Use concrete of approved mix designs only.
5. The proportioning of ingredients shall provide a concrete readily worked into forms and around reinforcement under conditions of placement to be employed, without segregation or excessive bleeding.
6. Do not place concrete until design mix for that class and type of concrete is reviewed by Architect.
7. Indicate locations in structure where each mix design is to be used.
8. Identify each mix design with code number which will be used on batch tickets.

B. Design Compressive Strengths: As indicated on Structural Drawings.

1. Normal Weight Concrete:
 - a. Compressive strength, when tested in accordance with ASTM C 39/C 39M, strength at 7 days shall be at least 60% of the minimum required 28 day strength unless noted otherwise on drawings.
 - b. Maximum slump 4 inches +/- 1".
2. Lightweight Weight Concrete:
 - a. Compressive strength, when tested in accordance with ASTM C 39/C 39M, strength at 7 days shall be at least 60% of the minimum required 28 day strength unless noted otherwise on drawings.
 - b. Maximum slump 4 inches +/- 1".
 - c. The air dry unit weight shall be determined by ASTM C567, except that the drying time shall be 90 days.

C. Maximum Size of Coarse Aggregate:

1. 1/5 narrowest dimension between form sides.
2. 1/3 depth of slabs.
3. 3/4 of minimum clear distance between reinforcing bars, wires, or bundles of bars.
4. 1 inch maximum for normal weight concrete or 3/4 inch maximum for light weight concrete.

D. Concrete Slump at Point of Discharge:

1. Ramps and Sloping Surfaces: Not more than 3 inches.
2. Reinforced Foundations: Not less than 1 inch and not more than 4 inches.
3. Concrete Containing Superplasticizer: Not more than 9 inches after addition of superplasticizer. Slump before addition of superplasticizer: 2 to 3 inches.
4. Other Concrete: Not less than 1 inch and not more than 4 inches.
5. Allowable tolerances of up to 1 inch above maximum indicated provided average of 10 most recent batches tested is less than maximum.

E. Minimum Cement Content: Not less than 470 pounds of total cementitious material per cubic yard of concrete. Not more than 25% flyash or pozzolan cement substitute and not less than 385 pounds of cement per cubic yard of concrete.

F. Water-Cement Ratios for Concrete (by weight):

1. Maximum permissible water cement ratio: 0.50 unless noted otherwise on drawings.

G. Admixtures:

1. Only use admixtures which have been tested and approved in mix designs.
 2. Air entraining Admixture:
 - a. Use in concrete exposed to freezing and thawing at any time during construction or in completed structure.
 - b. Use in concrete placed at ambient temperatures below 40 degrees F.
 - c. Tolerance on air content as delivered: Plus or minus 1-1/2 percent.
 3. Conform to air content requirements indicated on Drawings.
- H. Maximum water-soluble chloride ion concentrations in hardened concrete at ages from 28 to 42 days contributed from all ingredients, expressed as percent by weight of cement as follows:
1. Concrete over galvanized deck: 0.06 percent.
 2. Concrete exposed to chloride in service: 0.15 percent.
 3. Other concrete: 1.00 percent.
- I. Shrinkage Tests:
1. Prior to placing any concrete for walls or horizontal surfaces, a trial batch of each mix design of structural concrete shall be prepared using the aggregates, cement and admixture (if any) proposed for the project. From each trial batch at least 3 specimens for determining drying shrinkage shall be prepared. The drying shrinkage specimens shall be a 4" x 4" x 11" prisms fabricated, cured, dried, and measured in accordance with the requirements of Tentative Method of Test for Length Change of Cement Mortar and Concrete, ASTM C157. The measurements shall be made and reported separately for 7 and 28 days of drying after 7 days of moist curing. The effective gage length of the specimens shall be 10", and except for the foundation concrete, the average drying shrinkage at 35 days shall not exceed .054%.
 2. Previous Test: Ready-mixed concrete manufacturer may furnish certified test reports from approved Testing Laboratory as proof of meeting shrinkage requirements, provided aggregate used and concrete covered by such test report conform to mix design approved for use on this project. Method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs.
- J. Use accelerating admixtures in cold weather only when approved by Architect/Structural Engineer. Use of admixtures will not relax cold weather placement requirements.

2.08 MIXING

- A. Ready-Mix Concrete:
1. Comply with ASTM C 94/C 94M.
 2. Before using trucks for batching, mixing, and transporting concrete, thoroughly clean trucks and equipment of materials capable of contaminating concrete.

3. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 is required.
 4. When the air temperature is between 85 degrees F and 90 degrees F, reduce mixing and delivery time from 90 minutes to 75 minutes, and when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.
 5. Do not add water to ready-mix concrete at Project site except when slump is below specified limits and total water does not exceed the design water-cement ratio; inject added water into mixer and mix thoroughly before discharging.
- B. Provide certificate signed by authorized official of supplier with each load of concrete stating following:
1. Time truck left plant.
 2. Mix of concrete, identify with code number of mix design.
 3. Amount of water and cement in mix.
 4. Amount and type of admixtures.
 5. Amount of water added at project site.
 6. Time truck is unloaded at project site.
- C. Truck mixers without batch tickets will be rejected.
- D. Retain certificates at Project site. Submit to Architect for review upon request.

2.09 PRODUCTION

- A. Ready Mixed Concrete
1. Except as otherwise provided in these specifications, ready mixed concrete shall be batched, mixed, and transported in accordance with ASTM C94 "Specification for Ready Mixed Concrete."
- B. Lightweight Concrete
1. Lightweight concrete shall be batched and mixed as recommended by the concrete supplier to achieve accurate volume and the necessary quality.
 2. Aggregate storage conditions, batching, and mixing procedures shall prevent premature slump loss of the concrete during delivery and discharge.
- C. Mixing Water Control
1. Concrete which arrives at the jobsite with slump below that specified for placement may be adjusted by the addition of water to increase slump, provided the maximum slump is not exceeded and the maximum water content of the design mix is not exceeded. Following any such water addition, the concrete shall be mixed at mixing speed for at least 30 revolutions of the drum.
 2. After adjustment is made to the proper slump, the concrete shall be discharged as long as it retains its placeability without the further addition of water.
 3. Concrete shall be placed within one and one half hours after mixer is charged in average conditions. Time shall be reduced to one hour during hot weather concreting.

2.10 SOURCE QUALITY CONTROL

- A. Testing will be performed under the provisions of Section 01 45 23 "Tests and Inspections", except as otherwise specified.
- B. Independent Testing Laboratory, approved by Architect and employed by Contractor, is responsible for:
 - 1. Testing aggregate as follows at start of work and whenever change in aggregate source occurs:
 - a. Gradation and fineness modulus: ASTM C136.
 - b. Specific gravity: ASTM C127 for coarse aggregate, ASTM C128 for fine aggregate.
 - c. Organic impurities: ASTM C40.
 - d. Effect of organic impurities on strength: ASTM C87 for effect of organic impurities on strength.
 - e. Potential reactivity of aggregate: ASTM C295, petrographic examination.
 - f. Soundness: ASTM C88.
 - g. Reports of tests conducted on aggregates from the same source within the past 12 months will be acceptable.
 - 2. Testing concrete mixes as follows at start of work and whenever change in materials source occurs:
 - a. Prepare mix designs, test concrete strength, and report results if trial batch method is used to establish design mix proportions. Mix design shall be reviewed, approved, sealed and stamped by a Licensed Professional Engineer in the state where the project is located.
- C. Independent Testing Laboratory, employed by Owner, is responsible for observing and evaluating the following at batch plant at start of Work and at other times as requested by the Architect:
 - 1. Condition of batching equipment.
 - 2. Conformance with design mix proportions.
 - 3. Storage of materials.
 - 4. Mixing equipment.
 - 5. Mixing and transporting equipment.
 - 6. Other testing to verify compliance if requested by Architect.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine conditions and proceed with Work in accordance with Section 01 73 00.
- B. Verify forms, reinforcement, anchors, plates, joint materials, vapor retarder and other items to be cast into concrete are accurately placed and held securely.
- C. Verify forms are free of debris and water.
- D. Verify excavations are free of loose material and water.

3.02 TESTING

- A. Concrete materials and operations shall be tested and inspected for compliance with the specifications and requirements.

3.03 TESTING AGENCY

- A. The testing agency shall be designated by the owner. Ample time shall be allowed for preliminary tests as required prior to concreting operations.
- B. All testing agency personnel shall meet the requirements of ASTM E329, "Recommended Practice of Inspecting and Testing Agencies for Concrete and Steel in Construction."
- C. All testing agency personnel shall have the knowledge and ability to perform the necessary tests equivalent to the minimum guideline for Certification of Concrete Field Testing Technicians, Grade 1 in accordance with ACI CP-2.

3.04 DUTIES AND SERVICES

- A. The duties and responsibilities of the testing agency and the contractor and services to be performed by each are as designated in ACI 301, Chapter 16, "Specifications for Structural Concrete for Buildings."

3.05 EVALUATION AND ACCEPTANCE

- A. Test results of standard cylinders, molded, cured, and tested according to ASTM C31 and C39 should be evaluated separately for each concrete mix according to ACI 214, "Recommended Practice for Evaluation of Concrete Compression Test Results of Field Concrete."
- B. The criteria for acceptance of concrete shall be as detailed in ACI 318, Chapter 5, Section 5.6, "Evaluation and Acceptance of Concrete" or as per ASTM C94, Section 17 "Strength" and Section 18 "Failure to Meet Strength Requirements."
- C. As referenced in ASTM C94 – Section 4.4, "When the strength of concrete is used as a basis for acceptance, the manufacturer shall be entitled to copies of all test reports."

3.06 PREPARATION

- A. Construction Joints:
 - 1. Clean previously placed concrete of laitance.
 - 2. Clean reinforcement and accessories of mortar from previous concrete placement operations.
 - 3. Apply bonding agent in accordance with manufacturer's recommendations.
 - 4. Moisten surface of previously placed concrete.

3.07 PLACEMENT

- A. Place concrete according to ACI 301 and 304R, except as modified and supplemented on Drawings or in this Section.
- B. Notify Architect and Owner's testing laboratory minimum of 48 hours prior to commencement of placing operations.
- C. Cold Weather Concreting:
 - 1. Comply with requirements of ACI 306.1.
 - 2. Do not place concrete when ambient air temperature is expected to fall below 40 degrees F within 24 hours, except with prior written approval of Architect.
 - 3. Remove frost, ice, and snow from formwork, reinforcing, and accessories prior to placing concrete.
 - 4. Do not place concrete foundations, footings or slabs on frozen ground.
 - 5. Limit concrete temperature at time of discharge to 55 degrees F for sections less than 12 inches in any dimension and to 50 degrees F for other sections.
- D. Hot Weather Concreting:
 - 1. Comply with requirements of ACI 305R when ambient air temperature exceeds 75 degrees F.
 - 2. Use water-reducing, retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions to extend setting time to limits specified as approved by Architect.
 - 3. Cool aggregates, cool mixing water, substitute ice for part of mixing water, or take other measures to limit concrete temperature at time of discharge to 90 degrees F.
 - 4. Cover reinforcing steel and steel forms with water soaked burlap or use fog spray to limit temperature of steel to 120 degrees F immediately prior to concrete placement.
 - 5. Use evaporation retardant between finishing passes.
- E. At time of placement, provide concrete temperature between 50 degrees F and 90 degrees F.
- F. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- G. Repair underslab vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight.
- H. Separate slabs on grade from vertical surfaces with joint filler.
- I. Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

- J. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface. Conform to Section 07 92 00 "Joint Sealants" for finish joint sealer requirements.
- K. Install joint devices in accordance with manufacturer's instructions.
- L. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- M. Install joint device anchors for expansion joint assemblies specified in Section 07 95 16 "Expansion Joint Cover Assemblies". Maintain correct position to allow joint cover to be flush with floor and wall finish.
- N. Apply sealants in joint devices in accordance with Section 07 92 00 "Joint Sealants".
- O. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- P. Place concrete continuously between predetermined expansion, control, and construction joints.
- Q. Do not interrupt successive placement; do not permit cold joints to occur.
- R. Place floor slabs in pattern indicated.
- S. Saw cut joints within 12 hours after placing.
- T. Screed floors level, maintaining surface flatness of maximum 1/4 inch in 10 ft.
- U. Screed floors level, maintaining the minimum F(F) Floor Flatness and F(L) Floor Levelness values specified when measured in accordance with ASTM E 1155/ASTM E 1155M.
- V. Maintain surfaces receiving concrete at approximately same temperature as concrete being placed.
- W. Maintain surface of hardened concrete below 100 degrees F.
- X. Convey concrete from mixer to place of deposit by method that will prevent segregation or loss of material, and that will not require addition of water to produce desired slump at point of placement. Do not use supported reinforcing as runway base for concrete conveying equipment.

Y. Depositing:

1. Deposit concrete as nearly as practicable to its final location.
2. Place concrete continuously between construction joints.
3. Deposit concrete in layers not exceeding 24 inches in depth.
4. Avoid inclined layers.
5. Place each layer while preceding layer is still plastic.
6. Do not allow free fall of concrete to exceed 4 feet. Do not allow free fall of concrete containing high-range water reducing admixture to exceed 10 feet.
7. Drop concrete in vertical direction, not at incline.
8. Place beams, girders, haunches, brackets, column capitals, and drop panels monolithic with slab system unless otherwise indicated.
9. Do not cast beams, girders, and slabs supported on columns and walls until concrete in supporting element is no longer plastic, minimum of 2 hours.
10. If forms and reinforcing above level of concrete already in place become coated with accumulations of hardened or partially hardened concrete, remove accumulations before proceeding.
11. Place concrete without displacing reinforcing and accessories.

Z. Consolidation:

1. Vibrate concrete to eliminate formation of surface air voids, honeycombs and sand streaks.
2. Use mechanical, internal vibrators with proper frequency, rpm, and spud size. Select spud for size and spacing of reinforcement and clearance to formwork. Supplement vibration by hand-spading, rodding, or tamping.
3. Insert and withdraw vibrator vertically at spacing not to exceed 1-1/2 times radius of action of vibrator, maximum of 24 inch centers.
4. Insert vibrators into placed layer and at least 6 inches into preceding layer.
5. Do not allow vibrator to touch form face or embedded items.
6. Do not use mechanical vibration for slabs less than 4 inches thick. Use hand spading and tamping in these locations.

AA. Placing Concrete Slabs:

1. Deposit and consolidate concrete slabs in continuous operation, in single layer, within limits of construction joints, until placing of panel or section is completed.
2. Bring slab surfaces to correct level with straightedge and strike-off.
3. Use bull floats, highway straight edges, or darbies to produce smooth surface, free of humps or hollows before bleed water appears on surface.
4. Do not disturb slab surfaces prior to beginning finishing operations.

BB. Non-Structural Concrete Topping:

1. Placement on same day:
 - a. Place and consolidate base slab.
 - b. Screed to elevation to allow for topping slab thickness.
 - c. After bleed water has disappeared and surface will support worker's weight without indentation, place topping mixture, compact, float and finish.

2. Placement after one day:
 - a. Place and consolidate base slab.
 - b. Brush partially set surface with wire broom to remove laitance and scratch surface.
 - c. Wet cure base slab at least three days.
 - d. Immediately, prior to placing topping, clean base slab and dampen surface.
 - e. Scrub bonding grout into base slab surface or apply bonding agent in accordance with manufacturer's recommendations].
 - f. Rewettable bonding agent may be used only in areas not subject to wet conditions.
 - g. Place topping slab before grout has set or dried, compact, float and finish.

CC. Curbs and Equipment Pads:

1. Form curbs and equipment pads in areas indicated.
2. Placement on same day:
 - a. Place and consolidate base slab.
 - b. Screed to elevation to allow for curb/pad thickness.
 - c. After bleed water has disappeared and surface will support worker's weight without indentation, place curb/pad concrete mixture, compact, and float.
3. Placement after one day:
 - a. Place and consolidate base slab.
 - b. Brush partially set surface with wire broom to remove laitance and scratch surface.
 - c. Wet cure base slab at least three days.
 - d. Immediately, prior to placing curb/pad concrete, clean base slab and dampen surface.
 - e. Scrub bonding grout into base slab surface, or apply bonding agent in accordance with manufacturer's recommendations.
 - f. Place curb/pad concrete before grout has set or dried, compact and float.
4. Finish interior curbs and pads by stripping forms while concrete is still green and steel trowel surfaces to hard, dense finish with corners, intersections and terminations slightly rounded.

3.08 DEPOSITING

- A. Concrete shall be continuously deposited. When continuous placement is not possible, construction joints shall be located as approved by the Architect. Concrete shall be deposited as close to its final point of placement as possible.
- B. Concrete shall be consolidated by vibration, spading, rodding or forking. Work concrete around reinforcements, embedded items and into corners. Eliminate all air or rock pockets and other causes of honeycombing, pitting or planes of weakness.

- C. Internal vibration shall have a minimum frequency with amplitude to consolidate the concrete effectively. See ACI 309, "Recommended Practice for Consolidation of Concrete."
1. Vibrators shall be operated by experienced and competent workmen.
 2. Use of vibrators to transport concrete shall not be allowed.
 3. Vibrators shall be vertically inserted every 18 inches for 5 to 15 seconds and then withdrawn.

3.09 FINISHING

- A. General: Provide finishes at specified locations, unless indicated otherwise.
- B. Finishing Formed Surfaces:
1. Rough Form Finish:
 - a. Leave surfaces with texture imparted by forms, except patch tie holes and defects.
 - b. Remove fins and other projections exceeding 1/4 inch in height.
 - c. Locations: Concrete surfaces not exposed to view.
 2. Smooth Form Finish:
 - a. Provide smooth, hard, uniform surface with minimum number of seams.
 - b. Repair and patch defective areas, fill tie holes, remove fins and other projections completely. Leave tie holes unfilled where indicated on Drawings.
 - c. Locations: Exposed concrete surfaces or concrete surfaces designated to receive coatings applied directly to concrete, such as waterproofing, dampproofing, plaster, painting, and other similar applied finishes.
 3. Smooth Rubbed Finish:
 - a. Provide smooth rubbed finish to newly hardened concrete, which has already received smooth form finish, not later than one day after form removal.
 - b. Moisten concrete surfaces and rub with carborundum brick or other abrasive device until uniform color and texture is produced.
 - c. Do not use cement grout other than cement paste drawn from concrete by rubbing process.
 - d. Locations: Where scheduled or indicated on Drawings
 4. Grout Cleaned Finish:
 - a. Provide grout cleaned finish to smooth form finished concrete which are complete and accessible.
 - b. Blend one part portland cement with 1-1/2 parts fine sand and mix with 1:1 ratio of bonding admixture and water to achieve consistency of thick paint. Match color of surrounding concrete.
 - c. Wet surface of concrete sufficiently to prevent absorption of water from grout and apply grout uniformly with brushes or spray.
 - d. Immediately after applying grout, scrub surface vigorously with cork float or stone to coat surface and fill air bubbles and holes.

- e. While grout is still plastic, remove excess grout by working surface with rubber float, sack or other means.
 - f. After surface becomes white from drying, rub vigorously with clean burlap.
 - g. Keep surface damp for minimum 36 hours after final rubbing.
 - h. Locations: Where scheduled or indicated on Drawings
5. Cork Float Finish:
- a. Remove forms at early stage, not later than 3 days after placement of concrete form control joints as indicated on Drawings.
 - b. Provide cork float finish to concrete which has already received smooth form finish.
 - 1. Mix one part portland cement and one part fine sand with sufficient water to produce stiff mortar.
 - 2. Dampen wall surface.
 - 3. Apply mortar with firm rubber float or trowel, filling voids.
 - 4. Compress mortar into voids using slow-speed grinder or stone.
 - 5. If mortar surface dries too rapidly to permit proper compacting and finishing, apply small amount of water with fog sprayer.
 - 6. Produce final texture with cork float using swirling motion.
- C. Locations: Where indicated on Drawings Finishes for Related Unformed Surfaces:
At tops of walls, horizontal offsets, and similar unformed surfaces, strike-off smooth and finish with texture matching adjacent formed surfaces.
- D. Slab Finishes:
- 1. Floor flatness/levelness tolerances:
 - a. F_F defines maximum floor curvature allowed over 24 inches. Computed on basis of successive 12 inch elevation differentials, F_F is commonly referred to as "flatness F-Number."
 $F_F = 4.57$
 Maximum difference in elevation, in inches, between successive 12-inch elevation differences.
 - b. F_L defines relative conformity of floor surface to horizontal plane as measured over 10 feet distance. F_L is commonly referred to as "levelness F-Number."
 $F_L = 12.5$
 Maximum difference in elevation, in inches, between two points separated by 120 inches.
 - c. Measure floors in accordance with ASTM E1155.
 - d. Ensure slabs achieve specified overall tolerances. Minimum local tolerance (1/2 bay or as designated by Architect) is 2/3 of specified tolerance unless noted otherwise.
 - 2. Scratch Finish:
 - a. Level to F_F15/F_L13 tolerance with minimum local tolerance of F_F13/F_L10 roughen surface with stiff brushes or rakes before final set.
 - b. Locations: Slabs to receive thick set mortar beds, concrete floor topping, portland cement terrazzo and other similar bonded cementitious finish flooring materials over 1 inch in thickness.
 - 3. Float Finish:

- a. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating.
 - b. Begin floating when surface water has disappeared and when concrete has stiffened sufficiently to permit operation of power-driven floats.
 - c. Cut down high spots and fill low spots.
 - d. Immediately after leveling, re-float surface to uniform, sandy texture and a F_F20/F_L17 tolerance.
 - e. Locations: Surfaces requiring trowel finish, broom finish, slab surfaces covered with insulation, slabs scheduled to receive adhered roofing membrane, waterproofing membrane, exposed aggregate finish and sand bed terrazzo.
4. Trowel Finish:
- a. After float finish, follow by power troweling and then hand troweling.
 - b. Begin final troweling when surface produces ringing sound as trowel is moved over surface.
 - c. Finish surface free of trowel marks, uniform in texture and appearance, and to F_F25/F_L20 elevated slab tolerance.
 - d. Grind surface smooth to remove defects which may telegraph through applied finish.
 - e. Locations: Slabs left exposed to view, slabs covered with resilient flooring, carpet, paint and other similar applied finish.
5. Fine Broom Finish:
- a. After trowel finish, while surface is still plastic, draw soft fiber bristle broom uniformly over surface to create fine-grained but smooth texture to match Architect's sample.
 - b. Locations: Interior slabs covered with thin set tile, stairs, and ramps.
6. Heavy Broom Finish:
- a. After float finish, while surface is still plastic, draw fiber bristle broom uniformly over surface to provide texture perpendicular to main traffic or at right angles to floor slope to match Architect's sample.
 - b. Locations: Garage floors, sidewalks, ramps, exterior steps, landings, and platforms.
- E. Construction and Control Joints in Slab-on-grade:
- 1. Construction joints to coincide with planned control joint pattern.
 - 2. Provide joints in at column lines and as indicated on Drawings.
 - 3. Tooling Control Joints and Construction Joints:
 - a. Slabs Exposed to View: Tool joints after finishing slab.
 - b. Concealed Slabs:
 - 1) Provide joints immediately after final finishing.
 - 2) Use dry-cut sawing system (Soft-Cut) to depth of 1 inch unless noted otherwise; without dislodging aggregates by sawing. Complete sawing no later than two hours after finishing at each control joint location.

3.10 CURING

A. General:

1. Comply with ACI-308, except as modified or supplemented.
2. Start immediately after placing and finishing concrete.
3. Protect from premature drying, temperature extremes, temperature variations, rain, flowing water, and mechanical injury.
4. Cure continuously, without allowing it to dry, for minimum period required for hydration of cement and hardening of concrete.
5. Maintain temperature of concrete above 50 degrees F for curing period.
6. Minimum Length of Curing Period:
 - a. High Early Strength Concrete: 3 days.
 - b. Other Concrete: 7 days.

B. Acceptable Curing Methods:

1. Concrete to receive Waterproofing, Dampproofing, or Membrane Roofing: Moist curing, moisture-retaining sheet covering, or chemical curing compounds.
2. Concrete to receive Hardeners or Sealers: Moist curing, moisture-retaining sheet covering, dissipating resin compounds, or chemical curing compounds; acceptable to manufacturer of hardener or sealer.
3. Concrete to receive Cement Setting Beds, Bonded Toppings: Moist curing, moisture-retaining sheet covering, or chemical curing compounds.
4. Concrete to receive Adhered Finishes: Moist curing, moisture-retaining sheet covering, acrylic curing/sealing compounds, dissipating resin compounds, or chemical curing compounds; acceptable to manufacturer of applied finish.
5. Cast-in-place Parking Structure Slabs: Moist curing, or dissipating resin compounds.
6. Concrete exposed to Direct Sun when Ambient Temperature Exceeds 75 degrees F: Where permitted, use white pigmented liquid compounds.
7. Other Concrete: Moist curing, moisture-retaining sheet covering, liquid membrane-forming compounds, or chemical curing compounds.

C. Acceptable Curing Procedures:

1. Moist Curing Unformed Surfaces:
 - a. Ponding: Maintain 100 percent coverage of water continuously.
 - b. Fog Spraying or Sprinkling: Maintain continuously moist with nozzles or sprayers.
 - c. Fabric Mats: Cover surfaces with wet burlap or other absorptive material which will not discolor concrete; keep continuously wet.
 - d. Sand: Minimum 2 inch thick layer, kept continuously saturated with water, free from deleterious materials which would stain concrete.

2. Sheet Curing Unformed Surfaces:
 - a. Wet surface of concrete with fine spray of water prior to applying sheet.
 - b. Immediately cover surface with polyethylene sheeting, waterproof paper, or burlap-polyethylene sheet.
 - c. Lap edges of sheeting minimum of 12 inches.
 - d. Repair damaged sheet.
 - e. Ballast sheet to prevent movement and blow-off.
3. Liquid Membrane-forming Compound Curing of Unformed Surfaces:
 - a. Apply in accordance with manufacturer's recommendations.
 - b. Protect surfaces from foot and vehicular traffic.
 - c. Curing compounds used must be compatible with adhesives used in setting carpet, resilient tile or sheeting flooring, and other similar finishes.
4. Curing Formed Surfaces:
 - a. Keep forms continuously moist.
 - b. Loosen forms for vertical surfaces to allow curing water to run between concrete and forms.
 - c. If forms are removed prior to end of curing period, continue curing with any of methods described for unformed surfaces.
5. Curing surfaces which are moist cured for first 24 hours may be cured by other acceptable methods for remaining curing period provided they are not allowed to become dry.

3.11 FIELD QUALITY CONTROL

- A. Field testing will be performed under the provisions of Section 01 45 23 "Tests and Inspections".
- B. Independent testing laboratory, employed by Owner, is responsible for:
 1. Sampling Fresh Concrete: ASTM C172, sample at point of discharge from mixer and additionally at point of discharge from end of pipe for concrete conveyed by pumping methods; if water is added at Project site, obtain another sample for testing.
 2. Concrete Temperature: Test each time slump and air content are tested and each time set of compressive strength test specimens is made.
 3. Slump: ASTM C143; one test from first truck at point of discharge each day, one test each time set of compressive strength test specimens is made, and when change in consistency occurs.
 4. Air Content of Plastic Mix:
 - a. For Normal Weight, Air Entrained Concrete: ASTM C231, pressure method or ASTM C173, volumetric method.
 - b. For Lightweight, Air Entrained Concrete: ASTM C173, volumetric method.
 - c. Make one test each time a set of compressive strength test specimens is made.
 5. Compressive Strength Tests:
 - a. Make and cure test specimens in accordance with ASTM C31, from concrete sampled at point of discharge from mixer and additionally at point of discharge from end of pipe for concrete conveyed by pumping methods.
 - b. Make one set of 4 test cylinder specimens for every 100 cubic yards, or for

- every 5000 square feet of slabs and walls, or fraction thereof, of each class of concrete, with at least one set for each class each day.
- c. Test cylinders in accordance with ASTM C39, 2 at 7 days for information, and 2 at 28 days for acceptance.
 - d. When frequency of testing will provide less than five strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches, or from each batch if fewer than 5 are used.
6. Environmental Conditions:
 - a. When ambient air temperature falls below 40 degrees F, record maximum and minimum air temperature in each 24 hour period; record air temperature inside protective enclosure; record minimum temperature of surface of hardened concrete.
 - b. When ambient air temperature rises above 85 degrees F, record maximum and minimum air temperature in each 24 hour period; record minimum relative humidity; record maximum wind velocity, and record maximum temperature of surface of hardened concrete.
 7. Observe conveying, placement and consolidation of concrete for conformance to Specifications.
 8. Observe condition of formed surfaces upon removal of formwork prior to repair of surface defects and observe repair of surface defects.
 9. Observe curing procedures for conformance with Specifications, record dates of concrete placement, start of preliminary curing, start of final curing, end of curing period.
 10. Observe Preparations for Placement of Concrete:
 - a. Inspect handling, conveying, and placing equipment, inspect vibrating and compacting equipment.
 - b. Inspect preparation of construction, expansion, and isolation joints.
 11. Observe preparations for protection from hot weather, cold weather, sun, and rain and preparations for curing.
 12. Observations of Concrete Mixing:
 - a. Monitor and record amount of water added at Project site.
 - b. Observe minimum and maximum mixing times.
 13. Other Inspections:
 - a. Grouting under base plates.
 - b. Grouting anchor bolts and reinforcing steel in hardened concrete.
 14. Test for Water Soluble Chloride Ion Content in Hardened Concrete:
 - a. Test in accordance with procedure described in FHWA Report No. FHWA RD-77-85.
 - b. Make one test for each set of compressive strength test specimens.
 - c. Test may be waived by Architect upon written request from Contractor after review of concrete design mix has been made.
 15. Verify slab flatness and levelness within 24 hours of placement for each slab finish at slab-on-grade and framed slabs in accordance with ASTM E1155. Perform minimum of 2 tests for each slab and finish; one at initial pour and second randomly chosen by testing laboratory.

C. Evaluation and Acceptance of Concrete:

1. Strength Test: Defined as average strength of two 28 day cylinder tests from

- each set of cylinders.
2. Acceptance Criteria Based on Strength Tests: Strength level of individual class of concrete is considered satisfactory if both:
 - a. Average of three consecutive strength test results equal or exceed required design compressive strength, and
 - b. No individual strength test result falls below required design compressive strength by more than 500 psi.
 3. Acceptance Criteria Based on Field Tests:
 - a. Core Tests: Where strength tests indicate concrete of deficient strength, obtain and test cores in accordance with ASTM C42, ACI 318 and ACI-301, at locations directed by Architect.
 - b. Strength level of concrete in area represented by core test is considered adequate if complies with the requirements of ACI 318.
 - c. Fill core holes with low slump concrete or patching mortar used to repair surface defects.
 4. Revise concrete mix proportions, curing procedures and protection as necessary to provide concrete conforming to Specifications.
- D. Acceptance of Structure:
1. Acceptance of structure for dimensional tolerances, appearance, and strength will be based on ACI-301, Chapter 18.
 2. Remove and replace concrete which does not meet acceptance criteria.

3.12 PATCHING AND REPAIRING DEFECTIVE CONCRETE

- A. General:
1. Rewettable bonding agent may be used only in areas not subject to wet conditions.
 2. Patching compound may only be used for concrete not exposed to view.
- B. Repairing Formed Surfaces:
1. Surface Defects Requiring Repair:
 - a. Color and texture irregularities.
 - b. Honeycomb, air bubbles, rock pockets, and spalls.
 - c. Fins, burrs and other surface projections.
 - d. Cracks.
 - e. Stains and other discolorations that cannot be removed by cleaning.
 2. Patch defective areas and tie holes immediately after removal of forms.
 3. Cut out honeycomb, rock pockets, and voids over 1/4 inch down to solid concrete but not less than 1 inch depth.
 4. Make edges of cuts perpendicular to concrete surface.
 5. Clean and dampen area including 6 inches of surrounding surface with water.
 6. Apply bonding grout by brushing into surface, after surface water has evaporated.
 7. Place patching mortar or patching compound before grout has set or dried.
 8. Compact patching material in place and strike off slightly higher than surrounding surface.
 9. Finish after minimum of one hour to match surrounding surface.

10. Flush out form tie holes, fill with patching mortar, patching compound, or precast cement cone plugs secured in place with bonding compound.
11. Cure repair areas by same methods as surrounding concrete or keep continuously damp for 7 days.

C. Repairing Unformed Surfaces:

1. Surface Defects Requiring Repair:

- a. Fine crazing cracks.
 - b. Cracks larger than 0.012 inch wide or cracks which penetrate to reinforcing.
 - c. Cracks penetrating completely through non-reinforced sections.
 - d. Spalling, popouts, honeycomb, and rock pockets.
 - e. High and low areas in slabs.
2. Correct high areas in hardened concrete by grinding after concrete has cured at least 14 days.
3. Correct high and low areas during, or immediately after, completion of initial floating operations by cutting high areas and by placing fresh concrete in low areas.
4. Repair defective areas, except isolated random cracks and single holes not exceeding 1 inch diameter, by cutting out and replacing with patching mortar or patching compound.
- a. Remove defective areas to sound concrete with clean, square cuts.
 - b. Dampen concrete surfaces in contact with patching material and apply bonding grout by brushing into surface, after surface water has disappeared.
 - c. Place patching mortar or patching compound before grout has set or dried.
 - d. Compact and finish to blend with adjacent finished concrete.
 - e. Cure in same manner as adjacent concrete.
5. Repair isolated random cracks and single holes not over 1 inch diameter with patching mortar.
- a. Groove top of cracks and cut out holes to sound concrete and clean area.
 - b. Dampen cleaned surfaces and apply bonding grout by brushing into surface, after surface water has disappeared.
 - c. Place patching material before bonding grout is set or dry.
 - d. Compact in place and finish to match adjacent concrete.
 - e. Keep patched area continuously moist for not less than 72 hours.

D. Structural Repairs: Contractor shall propose materials, methods, and procedures to the Architect for review and approval prior to proceeding with structural repairs.

3.13 PROTECTION

A. Protect finished work in accordance with Section 01 70 00 "Execution and Closeout Requirements".

- B. Protect concrete from construction traffic, weather, or mechanical damage for 14 days after placing.
- C. Provide raised runways for traffic areas.
- D. Protect concrete from staining.

END OF SECTION 03 31 00

CONCRETE FLOOR SEALING, AND HARDENING
SECTION 03 35 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Single application cure-seal-hardener:
 - a. New concrete floors.
 - b. Existing concrete floors.
 - 3. Submittal preparation.
 - 4. Clean-up.
- B. Related Sections:
 - 1. Section 03 31 00 Structural Concrete Work
 - 2. Section 32 13 13 Site Concrete

1.02 SUBMITTALS

- A. Submit under provisions of the Section 01 30 00 "Administrative Requirements".
- B. Material requirements for concrete to which cure-seal-hardener is to be applied, including cement type, water-cement ratio, type of trowel finish, limitations on admixtures, pigments, bonding agents, and bond breakers, etc.
- C. Product Data: Manufacturer's data sheets, including product specifications, test data, preparation instructions and recommendations, storage and handling requirements and recommendations, and installation methods.
- D. Maintenance instructions, including precautions for avoiding staining after application.

1.03 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301, ACI 302 and ACI 303.
- B. Obtain materials from same source throughout.

C. Installer Qualifications:

1. Applicator experienced with installation of product and certified by manufacturer, or applicator experienced with similar products and providing manufacturer's field technician onsite to advise on application procedures; and providing adequate number of skilled workers trained and familiar with application requirements.

D. Project Conditions:

1. No satisfactory procedures are available to remove petroleum or rust stains from concrete. Prevention is therefore essential. Take precautions to prevent staining of concrete prior to application of cure-seal-hardener and for minimum of three months after application:
 - a. Prohibit parking of vehicles on concrete slab.
 - b. If vehicles must be temporarily parked on slab, place drop cloths under vehicles during entire time parked.
 - c. If construction equipment must be used for application, diaper all components that might drip oil, hydraulic fluid, or other liquids.
 - d. Prohibit pipe cutting using pipe cutting machinery on concrete slab.
 - e. Prohibit temporary placement and storage of steel members on concrete slab.
2. Do not install products under environmental conditions outside manufacturer's absolute limits.
3. Do not use frozen material; thaw and agitate prior to use.

E. Warranty:

1. Provide manufacturer's warranty that a structurally sound concrete surface prepared and treated according to the manufacturer's directions will remain permanently dustproof, hardened, and water repellant. If after the specified sealing period the treated surface does not remain dustproof, hardened, and water repellent, provide, at manufacturer's expense, sufficient material to reseal defective areas.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sealer-Hardener:

1. Ashford Formula, by Curecrete, which is located at: 1203 W. Spring Creek Pl.; Springville, UT 84663; Toll Free Tel: (800) 998-5664; Tel: (801) 489-5663; Email: request info; Web: www.ashfordformula.com

B. Request for substitutions will be considered in accordance with the provisions of the Section 01 30 00 "Administrative Requirements".

2.02 MATERIALS

- A. Cure-Seal-Hardener: Ashford Formula; water-based chemically reactive penetrating sealer and hardener, that seals by densifying concrete so that water molecules cannot pass through, but air and water vapor can, while allowing concrete to achieve full compressive strength, minimizing surface crazing, and eliminating dusting.
 - 1. Colorless, transparent, odorless, non-toxic, non-flammable.
 - 2. Containing no solvents or volatile organic compounds.
 - 3. USDA approved for food handling facilities.
 - 4. Allowing traffic on floors within 2 to 3 hours, with chemical process complete within 3 months.
 - 5. No change to surface appearance except a sheen developed due to traffic and cleaning.
- B. Water: Clean, potable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared and are suitable for application of product.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver product in factory numbered and sealed drums, with numbers recorded for Owner's records.
- B. Store products in manufacturer's unopened drums until ready for installation.

3.04 INSTALLATION

- A. General:
 - 1. Install in accordance with manufacturer's instructions.
 - 2. If this is the applicator's first project using this product, provide the manufacturer's technical representative onsite to familiarize installers with proper procedures.
 - 3. Prevent damage to and soiling of adjacent work.
- B. Sealer-Hardener:
 - 1. New Concrete: Apply cure-seal-hardener to new concrete as soon as the concrete is firm enough to walk on after troweling, except on colored concrete, wait minimum of 30 days.
 - a. Spray on at rate of 20 square feet per gallon (4.8 sq m/L).
 - b. Keep surfaces wet with cure-seal-hardener for minimum soak-in period of 30 minutes, without allowing drying out or becoming slippery. In hot weather, slipperiness may appear before the 30 minute time period has elapsed. If that occurs, apply more cure-seal-hardener as required to keep entire surface in a non-slippery state for the first 15 minutes. For the remaining 15 minutes, mist the surface as needed with water to keep the material in a non-slippery state.
 - c. After this period, when treated surface becomes slippery, lightly mist with water until slipperiness disappears.
 - d. Wait for surface to become slippery again and then flush entire surface with water, removing all residue of cure-seal-hardener.
 - e. Squeegee surface completely dry, flushing any remaining slippery areas until no residue remains.
 - f. Wet vacuum or scrubbing machines may be used to remove residue, provided manufacturer's instructions are followed.
 - 2. Existing Concrete: Apply cure-seal-hardener only to clean bare concrete.
 - a. Thoroughly remove previous treatments, laitance, oil, and other contaminants.
 - b. Saturate surface with cure-seal-hardener; respray or broom excess onto dry spots.
 - c. Keep surface wet with cure-seal-hardener for minimum soak-in period of 30 to 40 minutes.

- d. If, after the 30-minute soak-in period, most of the material has been absorbed, remove all excess material using broom or squeegee, especially from low spots.
- e. If, after the 30-minute soak-in period, most of the material remains on the surface, wait until it becomes slippery and then flush entire surface with water removing all residue of cure-seal-hardener and squeegee completely dry, flushing any remaining slippery areas until no residue remains.
- f. If water is not available, remove residue using squeegee.

3.05 PROTECTION

- A. Protect installed floors until chemical reaction process is complete; at least three (3) months.
 - 1. Comply precautions listed under Project Conditions.
 - 2. Clean the floor regularly in accordance with manufacturer's recommendations because water will accelerate the sealing, and scrubbing will impart a shine.
 - 3. Clean up spills immediately and spot-treat stains with good degreaser or oil emulsifier.
- B. Precautions and cleaning are the responsibility of the Contractor performing the Work.

END OF SECTION 03 35 00

REINFORCED CONCRETE UNIT MASONRY
SECTION 04 22 00

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1;
2. Concrete unit masonry work;
3. Mortar and grout in connection with the installation of concrete block;
4. Placement of steel reinforcing for concrete block;
5. Supervision of dowel installation in concrete work;
6. Setting and incorporating into the concrete block of all accessories, sheet metal work, miscellaneous iron, anchor bolts, etc. furnished by other trades;
7. Installation of pre-cast concrete lintels;
8. High-lift or low-lift grout mix designs;
9. Associated hardware;
10. Submittal preparation;
11. Clean up.

B. Related Sections:

1. Section 03 21 00: Reinforcing Steel
 - a. Furnishing of reinforcing steel and installation of steel dowels cast in concrete for concrete block.
2. Section 03 31 00: Structural Concrete Work
 - a. Footings for masonry walls.
3. Section 05 12 00: Structural Steel
 - a. Furnishing of accessories, misc. steel, etc., incorporated into concrete block.
4. Section 06 10 00: Rough Carpentry
 - a. Forms, shoring and centering for masonry work.
5. Section 08 11 13: Hollow Metal Doors and Frames

1.02 REFERENCES

A. ASTM International (ASTM):

1. ASTM A36 - Standard Specification for Carbon Structural Steel.
2. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
3. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
4. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
5. ASTM A775 - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.

6. ASTM A996 - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
7. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction.
8. ASTM C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
9. ASTM C140 - ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units; 2018.
10. ASTM C426 - ASTM C426 – Standard Test Method for Linear Drying Shrinkage of Concrete Masonry Units; 2016.
11. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
12. ASTM C652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale).
13. ASTM D1056 - Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber.

1.03 SUBMITTALS

A. Samples or Mock-ups:

1. Submit one (1) sample of the manufacturer's complete custom color range to the Architect for color selection purposes prior to ordering material.

1.04 QUALITY ASSURANCE

A. Tests and Inspections:

1. Tests and Inspections shall be per Section 01 45 23 "Tests and Inspections".
2. Continuous inspection of masonry shall be performed by special inspector approved by DSA during laying and grouting.

B. Concrete Masonry Units:

1. Furnish manufacturer's certificate attesting that units delivered to site meet material and property requirements specified, including linear shrinkage requirements; otherwise, concrete masonry units shall be sampled from material delivered to the site by the testing laboratory or project inspector, and tested by the testing laboratory as specified in ASTM C140 for compliance, and tested for linear shrinkage according to ASTM C426. Testing shall be completed, and the units approved prior to placing units in the work.
2. Tolerances:
 - a. Unit masonry shall be placed within one-eighth (1/8") of noted dimensions.
 - b. Reinforcement shall be placed within tolerances recommended by ACI Detailing Manual – Special Publication, SP-66.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

1. Basalite Concrete Products, LLC, dba Basalite Selma, contact rep: David Willis e-mail: david.willis@paccoast.com, (559) 896-1649.
2. Angelus Block Co., Inc, Bakersfield, contact rep: Roger Beckett, e-mail: info@desertblock.com, (661) 858-2072.
3. Or approved equal.

2.02 MATERIALS

A. Concrete Block:

1. Concrete block shall comply with per ASTM C90, Type I, medium weight Requirements.
 - a. Color shall be as directed by Architect
 - b. Types and size of block shall be as shown on drawings.
 - c. Block mix shall have a water repellant admixture, SPG # VL 25/25 or BASF Rheopel Plus.

B. Portland Cement:

1. Portland cement shall conform to ASTM C-150, Type II, with the following exceptions:
 - a. The cement shall not contain more than 0.60 percent total alkali when calculated as Sodium Oxide.
 - b. The percentage of Tricalcium Silicate is not limited.

C. Grout:

1. Comply with ASTM C476, Coarse Aggregate
2. Coarse grout proportioned by weight shall contain not less than 564 pounds of cementitious material per cubic yard.
3. Strength: 2000 psi at 28 days.
4. Sika Grout Aid Type II shall be used in grout.

D. Hydrated Lime:

1. Hydrated lime shall conform to Type S per ASTM C270.

E. Water:

1. Water shall be clean, free from deleterious acids, alkali, oil, and organic matter.

F. Reinforcing Steel:

1. Refer to Section 03 21 00 "Reinforcing Steel:.

G. Mortar:

1. Mortar Type "S" per ASTM C270, proportions based on loose volumes:
 - a. Portland Cement: 1 part
 - b. Hydrated lime or lime putty: 1/4 part (min.)
 - c. Sand (damp, loose volumes): Not less than 2 1/4 and not more than 3 times the sum of the separate volumes of cementitious materials.
2. Pre-mixed Mortar Type "S" per ASTM C270
 - a. Amerimix
 - b. Spec-Mix
 - c. Or approved equal
3. Mortar shall have a water repellent admixture; SPG # VL 25/25 or BASF Rheopel Plus.
4. Mortar Strength:
 - a. Mortar shall attain a minimum compressive strength of 1800 psi at 28 days.
5. Mortar Color:
 - a. Natural gray.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Start of work shall be considered as acceptance of existing conditions.

3.02 PREPARATION

- A. Masonry units shall be clean and free from dust, grease, or other objectionable material.

3.03 DELIVERY, STORAGE, AND HANDLING

- A. Cement shall be stored in such a manner as to protect it from inclusion of foreign material and damage by moisture.
- B. Only one (1) brand of cement shall be used for this work.

3.04 INSTALLATION OR APPLICATION

- A. Install per the manufacturer's latest written recommendations.
- B. Joints
1. Block shall be laid with three-eighths inch (3/8") minimum thick mortar bed on entire horizontal surface of block.
 2. Solidly fill head joints.

3. Mortar joints shall be straight, clean, and uniform in thickness and shall be tooled with a steel rod as required to obtain a concave-rodged joint.
 - a. Produce a dense joint surface well-bonded to the block at the edges.
4. Walls to receive plaster, or in concealed locations, shall have flush struck joints.
5. Joints to be concealed under paint shall be filled flush and then sacked to produce a dense surface without sheen.

C. Alignment:

1. Block shall be laid in running bond, unless otherwise indicated.
2. Block shall be laid in a manner that preserves an unobstructed vertical continuity of the cells to be filled.
3. Remove overhanging mortar or other obstruction from inside the cells and from the reinforcing.

D. Mortar:

1. Materials for mortar shall be measured in suitable calibrated devices.
 - a. Shovel measurements will not be accepted.
2. Lime shall be the last material added to the mix.
3. Mix for at least 3 minutes in a mechanical batch mixer.
4. Re-tempering of mortar shall be done only by adding water into a basin made with the mortar.
 - a. Carefully work the water into the mortar.
 - b. Mortar that is non-plastic or over 1-1/2 hours old shall not be used.

E. Placing of Reinforcement:

1. Clean reinforcement to be free of mortar, oil, dirt, loose mill scale, excessive rust, or other coatings that would destroy or reduce the bond.
2. Bends shall be made around a pin having a diameter of not less than four (4) times the bar diameter for stirrups and ties and six (6) times the bar diameter for other bars, except for bars larger than one-inch (1") which shall be eight (8) times the bar diameter.
 - a. Bars shall be bent cold.
3. Reinforcing shall be accurately placed.
4. Reinforcing shall be fully embedded in grout.
 - a. Do not embed in mortar or mortar joints, except for wall mesh as indicated on the drawings.
5. Maintain one-half inch (1/2") minimum clearance between any bar and masonry.
6. Where the low-lift grouting method is used, the vertical bars shall be placed prior to the erection of the wall and shall be held in position at top and bottom, and at intervals not exceeding 192 diameters of the reinforcement with at least No. 16 gauge annealed wire.
7. Reinforcement that will be included in a grout pour shall be positioned and wired in place before the cells are grouted.
 - a. It is not permissible to "stick" the bars in the grout.

8. High Lift Grout Method:

- a. Both horizontal and vertical reinforcing shall be held in position by wire ties or spacing devices near ends and at intervals not exceeding one hundred sixty (160) diameters of the reinforcement.
- b. Horizontal reinforcing shall be placed as the work progresses and the vertical reinforcing may be dropped into position after the completion of the laying if adequate positioning devices are provided to hold the reinforcement.

F. Dowels:

1. Supervise and be responsible for the proper installation of reinforcing dowels by others.
 - a. Dowels shall not be bent to obtain the proper alignment.

G. Splicing:

1. Splices shall be made with a lap of at least seventy-two (72) bar diameters, unless otherwise noted.
2. Bars shall be placed in contact and wired together to maintain proper clearances.
3. Stagger horizontal splices at least four feet (4'-0").
4. No splices in the vertical reinforcement will be allowed, unless shown on the drawings

H. Embedded Items:

1. Cooperate with other tradesmen to ensure that conduit, anchor bolts, sleeves, inserts, hangers, hollow metal door frames, etc., are properly installed and secured in the correct position.
2. Embedded items shall be thoroughly clean and free from rust, scale, oil, or other foreign matter.
3. Do not embed pipes, other than electrical conduit.
 - a. Rigid electrical conduit may be embedded in structural masonry where indicated on the approved drawings
4. Accurately secure embedded and secure items set in place before the grouting of the cells is started.
 - a. Set bolts in place by using a wood template.
5. Bolts shall be grouted in place, with not less than one inch of grout between the bolt and the masonry.

I. High Lift Grouting:

1. The method of grouting, either the high lift or the low lift method, shall be as specified.
2. The high lift method shall conform to the provisions of Title 24, Section 2104A.1.3.1.1.1.2, and IR 21-2, Division of the State Architect, Structural Safety Section.

3. Contact surface of all foundations that are to receive masonry work shall be cleaned and roughened in accordance with Section Construction Joints of Section 03 31 00 "Structural Concrete Work", or by sand blasting.
4. Cleanout openings shall be provided for all cells.
5. A sand blanket shall be provided over the exposed surface of the foundation to prevent mortar droppings from bonding to it.
 - a. Remove sand blanket prior to grouting.
6. Mortar overhangs and droppings shall be removed from the cell walls and the reinforcing by rodding.
7. When stacked bond is used, wire ties shall be embedded in the horizontal mortar joints across continuous vertical joints to prevent "blow-outs."
8. Grout mix shall be prepared by a Testing Laboratory and approved by the Structural Engineer before grouting is started.
 - a. Contractor shall pay for the cost of the grout mix design.
 - b. Grout mix shall be based on the following proportions:
 - 1) Material: Cement
 - a) Proportions: 1
 - 2) Material: Sand
 - a) Proportions: 3
 - 3) Material: Pea Gravel
 - a) Proportions: 1.5 to 1.8 (Aggregates measured in a damp, loose volume)
 - c. Minimum Cement Content: 6.3 sacks per cubic yard.
 - d. Required Admixture: Sika Grout Aid (6#/cu. yd.), BASF Rheopel
 - e. Slump: Nine (9) to ten (10) inches
9. Grouting shall be done in one (1) continuous operation from the top of the footing to top of wall in two-foot (2'-0") lifts.
 - a. The maximum height of grout poured in one workday (8 hours) shall be as follows for size of unit indicated:
 - 1) Eight-inch (8") units: Twelve feet (12').
 - 2) Twelve-inch (12") units: Sixteen feet (16').
 - b. No horizontal construction joints are permitted, but vertical construction joints can be used in locations approved by the Engineer.
 - c. Each lift of grout shall be vibrated with a mechanical vibrator.
 - d. There shall be a waiting period of one half (1/2) to one (1) hour between lifts to allow each lift to consolidate before pouring the next lift.
 - e. In vibrating the upper lifts, the vibrator shall be dropped down twelve inches (12") to eighteen inches (18") into the preceding lift in alternate cells to reconsolidate it.
 - f. The top lift shall be reconsolidated also after the waiting period and topped off with grout.
10. Grout shall attain a minimum compressive strength of 2000 psi at 28 days.
11. During construction, the ungrouted walls shall be adequately braced against wind and other forces.

12. During construction, the ungrouted walls shall be adequately braced against wind and other forces.

J. Low Lift Grouting:

1. The method of grouting, either the high lift or the low lift method, shall be as specified. Low lift grouting shall conform to Title 24, Section 2104A.5.1.2.1.1.
2. Proportioning:
 - a. Material: Cement
 - 1) Proportions: 1
 - b. Material: Sand
 - 1) Proportions: 2.25 to 3.0
 - c. Material: Pea Gravel
 - 1) Proportions: 1.0 to 2.0 (Aggregates measured in a damp, loose volume)
3. Required Admixture: Sika Grout Aid Type II, BASF Rheopel Plus
4. Add water in the amount necessary to cause the grout to flow into all joints of the masonry without segregation.
5. Grout shall attain a minimum compressive strength of 2000 psi at 28 days.
6. Fill all cells with grout in lifts not exceeding 4'-0" in height.
 - a. Masonry units shall not be laid more than 4'-0" in height before grouting.
7. If grouting is stopped for one hour or more, horizontal construction joints shall be formed by stopping the grout 1 ½ " below the top of the unit.
8. Grouting of beams over openings shall be done in a continuous operation.
9. Grout shall be rodded with a heavy reinforcing bar or vibrated with a mechanical vibrator immediately after placing.
10. Hollow metal door and window frames shall be grouted in place. Coordinate with frame supplier for positioning of metal frame ties.

3.05 CLEANING OR REPAIR

- A. Use care to keep the masonry clean.
 1. Mortar dropped or spattered on the work shall be removed immediately, and the surface washed clean.
- B. Remove all surplus material, equipment, and debris from the premises which result from this operation.

END OF SECTION 04 22 00

STRUCTURAL STEEL FRAMING

SECTION 05 12 00

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1.
2. Structural steel work is as shown in drawings, including schedules, notes and details to show size and location of members, typical connections and type of steel required.
3. Structural steel is that work defined in AISC" Code of Standard Practice" and as otherwise shown on drawings.
4. Shop priming and field touch-up to extent specified.
5. Grouting under base plates.
6. Employment of a licensed surveyor registered in the state where the project is located to certify lines and levels of installed structural steel.
7. Submittal preparation.
8. Clean up.

B. Related Sections:

1. Section 03 21 00: Reinforcing Steel.
2. Section 05 50 00: Metal Fabrications
 - a. Steel fabrications affecting structural steel work.
3. Section 07 62 00: Sheet Metal Flashing and Trim.
 - a. Roof and seismic expansion joints.

1.02 REFERENCES

A. American Institute of Steel Construction (AISC)

1. AISC (MAN) - Steel Construction Manual; American Institute of Steel Construction, Inc., latest edition.
2. AISC Specifications for the Design Fabrication and Erection of Structural Steel for Buildings, including the Commentary and Supplements thereto as issued.
3. AISC S303 - Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc.
4. AISC S348 - Specification for Structural Joints Using ASTM A325 or A490 Bolts.

5. AISC – Specification for Architectural Exposed Structural Steel.
6. AISC – Seismic Provisions for Structural Steel Buildings.

B. ASTM International (ASTM):

1. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel.
2. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A 108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.
4. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
5. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
6. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
7. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
8. ASTM A 449 - Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use.
9. ASTM A 490 - Standard Specification for Structural Bolts, Alloy Steel, Heat-Treated, 150 ksi Minimum Tensile Strength.
10. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
11. ASTM A 501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
12. ASTM A 563 - Standard Specification for Carbon and Alloy Steel Nuts;
13. ASTM A 572/A 572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
14. ASTM A 992/A 992M - Standard Specification for Structural Steel Shapes.
15. ASTM A913/A913M Grade 65.
16. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink).
17. ASTM E 94 - Standard Guide for Radiographic Examination.
18. ASTM E 164 - Standard Practice for Ultrasonic Contact Examination of Welded Elements.
19. ASTM E 165 - Standard Test Method for Liquid Penetrant Examination.
20. ASTM E 709 - Standard Guide for Magnetic Particle Examination.
21. ASTM F 436 - Standard Specification for Hardened Steel Washers.
22. ASTM F 959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
23. ASTM F 1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

- C. American Welding Society (AWS):
 - 1. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society.
 - 2. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society.
- D. California Building Code (CBC), 2022.
 - 1. California Code of Regulations (CCR) Title 24.
- E. Federal Emergency Management Agency (FEMA)
 - 1. FEMA – 450-1/2003 edition Part 1 – Provision.
 - 2. FEMA – 450-2/2004 edition Part 2 - Commentary.
- F. Society for Protective Coatings (SSPC)
 - 1. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings.
 - 2. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings.
- G. Underwriters Laboratories (UL)
 - 1. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements", for submittal procedures. Allow adequate time to check the number of drawings in each submittal. A normal two-week turnaround time applies to individual non-overlapping submittals not exceeding 200 sheets.
- B. Product Data: Submit copies of producer's or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data required to show compliance with these specifications (including specified standards).
- C. Certified Mill Test Reports: Structural Steel (each type) indicate chemical, physical properties, destructive test analysis and non-destructive test analysis.
- D. Welding electrodes.
- E. Welding gas.
- F. Unfinished bolts and nuts.
- G. Structural Steel Primer Paint.
- H. High-strength bolts, including nuts and washers.

- I. Charpy –V-Notch (CVN) Impact Tests: Submit certified copies of Charpy-V-Notch (CVN) Impact Tests by the manufacturer for all applicable steel members and components in accordance with Section 6.3 of the AISC Seismic Provisions for Structural Steel Buildings.
 - 1. Charpy-V-Notch (CVN) impact tests in accordance with ASTM E23-07 and ASTM A673-07.
 - 2. Charpy-V-Notch tests shall be performed by the manufacturer employing Test Frequency (P) per ASTM A673-07 and utilizing standard specimen sizes shown in Figure 6 of ASTM E23-07. The absorbed energy in a CVN impact test shall not be less than that specified in material Section 2 of these specifications.
- J. Submit certified copies of test of manufacturer for the fine grain practice. All structural steel base material which is as described in Paragraph 1.5, E.1 above shall be manufactured using fully killed fine grain practice having grain size number 5 or better as determined by ASTM E-112.
- K. Shop Drawings: Submit shop drawings, including complete details and schedules for fabrication and shop assembly of members, and details, schedules, procedures and diagrams showing the sequence of erections. Fully detail minor connections and fastenings not shown or specified in the Contract Documents to meet required conditions using similar details as shown in the Contract Documents. Include a fully detailed, well controlled sequence and technique plan for shop and field welding that minimizes locked-in stresses and distortion; submit sequence and technique plan for review by the Architect.
 - 1. Include details of cuts, connections, camber, holes per Figure 5.2 of AWS D1.1 or AISC Section J1.8, weld position plan and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld.
 - 2. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed for work specified in other sections.
 - 3. Shop drawings shall use the “United States Standards” system dimensioning (feet, inches, etc.). Shop drawings which use only metric system of measurements will be rejected.
 - 4. Shop drawings shall be drawn on sheet sizes not less than 24” x 32”.
 - 5. During the shop drawings submittal phase, if the Contractor cannot establish approved documents within two submissions, he will assume the responsibility for the additional cost incurred by the Architect for the additional reviews.
 - 6. No deviation of structural details or framing shall be made in the shop drawings without prior approval by the agency having jurisdiction and the Architect.
 - 7. All approved deviations from the contract documents through the Request for Interpretation (RFI) process shall be referenced on the shop drawings with appropriate RFI numbers.

8. The maximum number of shop drawing sheets in any submittal shall not exceed 200 for a minimum two-week review period by the structural engineer. The review period for additional submittals will begin at the end of the previous submittal review.
 9. Erection and Bracing Plan and Erection Procedure: Employ a Professional Engineer licensed in the state where the project is located to prepare an erection and framing plan including column, beams, and girders. This engineer shall be solely responsible for compliance with the plans. Keep a copy of this submittal at site. The plan shall follow the minimum procedures described below. Provide descriptive data to illustrate structural steel erection procedure including the following:
 - a. Equipment & method to be used in structural steel erection.
 - b. Sequence of erection.
 - c. Temporary guying and bracing required during erection prior to making permanent connection.
 - d. Provisions to be made for stresses resulting from loads imposed by piles of materials, erection equipment or other loads on the framing during erection.
 - e. Extent of completion and guying required for the intermediate floors between the floors being erected and the concrete poured floors.
 10. List of beams to be galvanized.
 11. List of stress relieved joints.
- L. Weld Procedures: Contractor shall submit all welding procedures, stamped, and signed by a professional engineer licensed in the state where the project is located, for review by the owners testing and inspection firm, the structural engineer of record, and the Building Department. Welding procedures shall be qualified as described in AWS D1.5, Section 5.12 or 5.13. All CJP single and/or double groove welds shall be back gouged unless otherwise noted on the drawings. Weld procedure shall indicate joints details and tolerances, back gouge, preheat and interpass temperature, postheat treatment, single or multiple stringer passes, peening of stringer passes for groove welds except for the first and the last layers, electrode type and size, welding current polarity and amperes and root treatment. The welding variables for each stringer pass shall be recorded and averaged; from these averages the weld heat input shall be calculated.
- M. Test Reports: Submit copies of tests conducted on shop and field welds and bolted connections. Include data on type of tests conducted and test results.
- N. Provide Procedure Qualification Record (PQRs). For all the qualification tests of FCAW in the horizontal position use 2 ½ inch thick plate and for the vertical position one-inch-thick plate shall be used. All PQR shall be in accordance with AWS D1.5.
- O. Welders Certificates: All field welders shall be job certified per AWS D1.1. All shop welders shall be job certified for FCAWS per AWS D1.1.

- P. Submit Manufacturer's Certificates, certifying welders employed on the Work, verifying AWS qualification within the previous 12 months. All welders welding material with a thickness of one and one half (1-1/2) inches or greater shall be recertified for this project in accordance with AWS D1.1 requirements. (or shall be certified within the past 12 months and has welded this type of material within the past 3 months).
- Q. Stress Relieving Method.

1.04 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC "Manual of Steel Construction" in AISC certified shop.
- B. Comply with Section 10 of AISC "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.
- C. Maintain one copy of each document on site.
- D. Fabricator: Refer to this section, paragraph 1.05B.
- E. Erector: Refer to this section, paragraph 1.05C.
- F. Weld procedures for non-rigid frame connections shall be qualified and must be reviewed and approved by the Architect and by the governing agency.
- G. Continuous inspection by a Registered Deputy Inspector hired by the owner and approved by the Architect and governing agency will be provided during fabrication.
- H. To assure the proper amperage and voltage of the welding process, the use of the handheld calibrated amp and voltmeter shall be used. The handheld amperage and volt meters shall be calibrated at the start of each shift or once a day as a minimum. This equipment shall be used by the fabricator, erector, and the inspectors. Amperage and voltage shall be measured near the arc. Travel speed and electrode stick out shall be verified to be in compliance with the approved welding procedures.
- I. Inspection agency approved by the Architect and by the governing agency will perform visual inspection of all welds.

- J. Contractor's Responsibility: The Contractor alone shall be responsible for the correct fitting of structural members and the elevation and alignment of the finished structure. The Contractor shall be responsible for establishing, setting, and maintaining control points and building lines to be used in plumbing the structural steel frame in accordance with AISC Code of Standard Practice, Section 7.11 and shall verify the following:
1. Verify that anchor bolts are located as specified on the Drawings and are in proper relation to the control points and building lines, prior to setting of structural steel.
 2. Verify that structural steel members have been located, elevated, plumbed and aligned in relation to the control points and buildings lines, within the tolerance permitted by AISC Code of Standard Practice, Section 7.11 and as specified in Section 3.3. Any adjustments necessary in the steel frame because of fabrication, construction or erection discrepancies in elevations and alignment shall be the responsibility of the Contractor.
 3. At the location identified by Floor (refer to Section 033000 Flatness and Levelness), record steel elevations prior to, and after the completion of concreting operations. Readings shall be taken from below the steel members. Locations of readings shall be marked in a manner which will allow subsequent elevations to be taken at the same points. These data shall be submitted to the Architect for review.
- K. Survey Work:
1. Contractor shall employ a registered surveyor to establish control points and layout work for the Building Control Lines, The Contractor shall conduct layout work and elevations for erection of structural steel.
 2. Check elevations of concrete and masonry bearing surfaces and anchor bolts locations prior to erection and submit any discrepancies to Architect prior to start of erection. Corrections or adjustments to the structural steel shall be made and submitted for approval prior to start of erection.
 3. Upon completion of erection of steel frame and before the start of work specified in other sections that are supported, attached or applied to the frame, make a final survey of the frame and submit a report to the Architect within 3 days certifying compliance with the specified tolerances.
- L. Codes and Standards: Comply with Paragraph 1.4 and provisions of following, except as otherwise indicated:
1. AISC "Code of Standard Practice for Steel Buildings and Bridges."
 - a. Paragraph 4.2.1 of the above Code is hereby modified by deletion of the following sentence: "This approval constitutes the Owner's acceptance of all responsibility for the design adequacy of any connections designed by the fabricator as part of his preparation of these shop drawings."
 - b. Paragraph 4.4.2 delete in its entirety.

- c. Paragraph 7.9.3 of the above code is hereby modified by deletion of the following words: "The contract documents specify the sequence and schedule to placement of such elements."
 2. AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings" and including the Commentary" and Supplements thereto as issued.
 3. AWS D1.1 "Structural Welding Code.
 4. ASTM-A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes. Sheet Piling and Bars for Structural Use."
- M. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with the AWS "Procedure Qualification" and "Welder Qualification".
- N. Source Quality Control: Materials and fabrication procedures are subject to inspection and test in mill, shop and field, conducted by a qualified inspection agency appointed by the Architect. Such inspections and tests will not relieve contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
- O. Testing Laboratory shall perform conformance testing in accordance with the applicable codes and the following:
1. Identified Structural Steel: Steel shall be identified in accordance with ASTM A6 and bear legible heat numbers acceptable to the Testing Laboratory which shall make positive identification of structural steel as to mill source, heat numbers, and certified mill analysis and test report for each heat. Obtain the mill test reports, and furnish report certifying identity of steel.
 2. Unidentified Structural Steel: Steel not identified and certified as specified above shall be tested according to following requirements. Structural steel fabricator shall cut samples under direction of the Testing Laboratory. Testing Laboratory shall machine or otherwise prepare the specimens, and perform testing of each 5 tons or fraction thereof, for each size of unidentified steel except, in the case of random pieces or steel having F_y equal to or greater than 36 ksi, testing of each piece is required. Tests required are:
 - a. For pipe, one tension and elongation test and one flattening test of each size.
 - b. For all other steel, one tension and elongation test and one bend test for each size.
 - c. Additional test per Section 1.6.0.3 may be required for quantity when deemed necessary by the Architects or by the governing agency.
 - d. Contractor shall reimburse to the owner all cost paid by the owner for testing unidentified steel.
 3. Special Test Requirements: For all moment frame members for each heat the following tests are required in addition to the steel manufacturer's certified mill analysis and test reports.

- a. One set of tension testing samples of steel for each size of beam and each thickness of plate (excluding erection data) shall be taken from waste material. Tension test results shall be based upon testing that is conducted in accordance with Section O.3.b. Tension testing shall be conducted and reported for the following portion:
 - 1) Flanges and webs of beams and columns at locations per ASTM standards.
 - 2) Cover plates of the girder.
 - b. Tension testing shall be conducted in accordance with ASTM A6, ASTM A370, and ASTM E8, with the following exceptions:
 - 1) The yield stress F_y that is reported from the test shall be based upon the yield strength definition in ASTM E370, using the offset method at 0.002 strain.
 - c. Test coupons for grain size determination by an independent testing laboratory shall be taken by the fabricator and witnessed by the inspection agency at locations as specified in AISC Commentary A3.1 for rolled shapes and all plates 1 ½ inches thick and thicker.
 - d. For rolled shapes and plates with thickness of 1 ½ inches and thicker, test coupons for CVN verification employing test frequency (H) per ASTM A673 by an independent testing laboratory will be taken utilizing standard specimen size requirements for ASTM A6 and as noted in Submittal Paragraph 1.5.I.
- 4. For all other identified steel having F_y equal to or greater than 36 ksi, one tension and elongation test and one bend or flattening test, as applicable, for each heat plus steel manufacturer's certified mill analysis and test report as specified above shall be performed.
 - 5. Lamellar Tearing: Prior to welding all plates 1-1/2 inches thick and greater and all rolled shapes within the distance from 6 inches above the top of the moment frame joint to 6 inches below the bottom of the moment frame joint shall be checked by ultrasonic testing for laminations in base metal which may interfere with the inspection of the completed joint. Should these defects occur members will be rejected or corrections made subject to the approval of the architect and governing agency. Welding procedures specifications in Paragraph 1.5.L shall address proper welding practices to help minimize the danger of lamellar tearing.
 - 6. Testing of High Strength, Bolts, Nuts and Washers.
 - 7. Promptly remove and replace materials or fabricated components which do not comply.
- P. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work. Promptly notify the Architect whenever design of members and connections for any portion of structure are not clearly indicated.

- Q. For Exposed Structural Steel: Perform work in accordance with AISC – Specification for Architectural Exposed Structural Steel.
- R. Preheat and Interpass Temperatures:
1. The preheat temperatures and conditions given in AWS D1.1, Chapter 3 shall be strictly observed with special attention given to Paragraph 3.5 for the thickness of material to be welded.
 2. Preheat temperatures should be measured at a distance from the weld equal to the thickness of the part being welded, but not less than three inches in any direction including the through thickness of the piece. Where plates are of different thickness, the pre-heat requirements for the thicker plate should govern. Maintenance of pre-heat temperatures through the execution of the weld (i.e. the interpass temperature) is essential. Maximum interpass temperature should be limited to 550 degrees Fahrenheit for all complete joint penetration welds. Welding operators and inspectors shall be in possession of and utilizing temperature measure devices. Temperature indicating sticks may be used.
- S. When ambient temperature drops below 50°F or under circumstances where the wind chill at higher temperature would increase the heat loss to be equivalent to a temperature of 50°F controlled cooling shall be provided by wrapping insulating blankets over the welded assembly immediately after completion of welding.
- T. Stress Relieving shall be provided for both shop and/or field welded assemblies identified on the drawings using one of the following methods:
1. Thermal using an oven (in accordance with AWS D1.1
 2. Thermal using localized heating with insulation blankets.
 3. Mechanical using vibration with proof of stabilization.
 4. Whichever method is used the proposed procedure shall be reviewed and approved by the Engineer of Record prior to start of work and the company doing the work must be approved by the engineer of record.

1.05 QUALIFICATIONS

- A. Qualifications: Contractor shall determine, warrant, and certify that producer, detailer, fabricator, erector, materials suppliers and all other involved in the Work of this Section with minimum five year documented experienced for at least five building 5 stories or more in height.
- B. Fabricator: AISC certified shop for complex structures specializing in performing the work of this Section with minimum five year documented experience in fabrication of structural steel for at least five buildings 5 stories or more in height.
- C. Erector: Company specializing in performing the work of this Section with minimum five year documented experience in the erection of structural steel for at least five buildings 5 or more stories in height.

1.06 FIELD MEASUREMENTS

- A. Contractor shall verify that field measurements are as shown on the Contract Documents. Contractor shall furnish accurate as-built drawings of bolt settings for work specified in this section and other sections.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to site at such intervals to insure uninterrupted progress of work. Protect all steel materials from damage during shipping, handling, and storage on the site. Steel showing dents, creases, deformations, weathering, or other defects is not acceptable. Deliver welding electrodes to site in unbroken packages bearing the manufacturer's name and label identifying the contents.
 - 1. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete, in ample time to not delay that work. Anchor bolts and template delivery shall be indicated as a milestone date on the project construction schedule.
- B. Storage of fabricated steel at the site shall be the responsibility of the Contractor. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and package materials from corrosion and deterioration.
- C. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as required by the architect.
- D. Other material shall be stored in weather-tight containers until ready for use in the Work. Containers must be stored in a dry place.
- E. The Architect reserves the right to reject any material that has become damaged because of improper storage.
- F. Storage areas must be shown on the current site use plan.
- G. High-strength bolts and certificates shall be identified, stored and tracked at the site until they are installed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide materials of type and grade indicated in the drawings.
- B. Load Indicator Washers: Provide washers complying with ASTM F 959 at all connections requiring high-strength bolts.

- C. Sliding Bearing Plates: Teflon coated.
- D. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C 1107 and capable of developing a minimum compressive strength of 7,000 psi at 28 days.
- E. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.
- F. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.
- G. All steel shall be manufactured using fully killed fine grain practice yielding grain size numbers 5 or greater as determined by ASTM E-112. Provide verification of fine grain practice in the mill certificates.
- H. All base metal that occurs within a distance of 6 inches above the top of joint to 6 inches the below bottom of joint (inclusive) for the column and extending along the beam 6 inches past the ends of the joint (ends of cover plates) assembly shall be ultrasonically tested for laminations per ASTM A898-91.
- I. Materials shall be ordered of sufficient size to allow for testing described in Paragraph 1.6 O of this specification.
- J. Welding Materials: AWS D1.1; type required for materials being welded. All welding electrodes shall be low hydrogen and shall have a minimum Charpy V-Notch toughness of 20 ft. lbs. at minus 20-degrees Fahrenheit per AWS. Use of FCAW T4 wires is specifically prohibited.
- K. Electrodes for Flux Cored Arch welding (FCAW) shall not have diameter greater than 7/64 inch and an electrical stick out greater than two inches.

2.02 FABRICATION

- A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in the shop to the greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on contract documents. Properly mark and match- mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
- B. Cleaning and Straightening: Wire brush steel materials and clean off loose mill scale and rust. Straighten steel members by non-injurious methods prior to fabrication. Remove twists or bends after punching or working component parts of a member before the parts are assembled. Produce finished members free from twists, bends, and open joints when erected.

- C. Provide and deliver test samples for material properties verifications per Paragraph 1.6.0.3 and 1.6.0.4 to the testing laboratory.
- D. The extent of the welding to webs of rolled sections shall be carefully controlled. The web welds shall not extend into the "K" dimension (web-flange intersection). Stress relief access holes shall be provided in the webs. If the access holes are made with a cutting torch or by means of air-arc cutting the surfaces of the holes shall be cleaned and made smoothly by grinding. Grinding shall be sufficient to remove surface transformation effects and any discontinuities or notches. A minimum thickness of material of 1/32" shall be removed by grinding. Regardless of the method employed to fabricate the stress relief access holes, the surface of the hole shall be smooth per AWS C4.1-77 Class 4; lack of smoothness shall be cause for rejection.
- E. Connections: Weld or bolt shop connections, as indicated.
- F. Welded Construction: Strictly comply with AWS D1.1 code for procedures, appearance, and quality of welds, and methods used in correcting defective welding work.
- G. Assemble and weld built-up sections by some method which will produce true alignment of axes without warp.
- H. After welding of complete joint penetration welds in moment frames, the backing bar and the run-off tabs shall be removed and grind flush except as noted on the drawings, and the weld and base metal is to be ground flush and smooth per AWS D1.1. The weld root shall be inspected, and magnetic particle tested per AWS requirements. If rejectable indications are found, remove by backgouging to sound metal. The backgouged area shall be welded, and the weld shall be reinforced with a fillet weld. Unless noted otherwise, the size of the reinforcing fillet weld shall be equal to 1/4 of the base metal thickness, but not less than 1/4", but need not exceed 3/8".
- I. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work including hole reinforcing as shown or required.
- J. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning.
- K. Holes in steel may be punched 1/16" larger than nominal diameter of bolt if steel thickness is equal to or less than 1/8" plus bolt diameter. If the steel is thicker than the diameter of the bolt plus 1/8", the holes shall be drilled or sub-punched and reamed. Diameter of sub-punched holes, and the drill for sub-drilled holes, shall be 1/16" smaller than the nominal diameter of bolt to be installed. Precisely locate

finished holes to ensure passage of all bolts through steel assemblies without drifting. Enlarge holes only by reaming. Poor matching of holes is cause for rejection.

- L. Anchor Bolts: Furnish anchor bolts and other connectors required for securing structural steel to foundations and other in-place work. Furnish templates and other devices as necessary for presetting bolts and other anchors to accurate locations. Punch and drill or ream holes in base and bearing plates. Do not make or enlarge the holes by burning except at grouting holes in column bases plates and then only with the approval of the Architect.
- M. Base Plates: Press or mill steel column base plates 4" thick or less for straight contact bearing between plate and column.
- N. Gas Cutting: Use of a cutting torch is allowed where the metal being cut is not stressed during the operation, and provided stresses are not transmitted through flame-cut surface. Make gas cuts with a smooth regular contour. Deduct 1/8" from the width of gas cut edges to determine the effective width of gas cut members. Make reentrant gas cut radius as large as possible, but 1" minimum. For reentrant corners (e.g. slots in tube steel braces) drill 1" (inch) diameter pilot holes.
- O. Welded Construction: Strictly comply with AWS Codes for procedures, appearance and quality of welds, and methods used in correcting welding work. Assemble and weld built-up sections by methods that will produce true alignment of axes without warp.
 - 1. Conform to AWS D1.1 and D1.3, as modified by referenced AISC Standards, and as indicated or noted on Drawings. Employ welding operators qualified in accordance with AWS D1.1 and D1.3, as applicable, who are thoroughly trained and experienced in arc welding and that produce uniformly reliable groove and fillet welds in flat, vertical, and overhead positions, and make neat and consistent welds. Weld all structural steel joints by shielded electric-arc method unless otherwise shown, specified, or approved.
 - 2. Qualifications of Welders: Each welder working on the Project shall be assigned an identification symbol or mark. Each welder shall mark or stamp his identification symbol at each completed weldment.
 - 3. Welders and Welding operators shall be qualified per AWS "Standard for Qualifications". The Contractor shall require any welder to retake the test when, in the opinion of the Architect, the Work of the welder creates a reasonable doubt as to the proficiency of the welder. All such tests shall be made using the filler metal to be used in actual fabrication.
 - 4. Test, when required, and costs for qualifying welders shall be conducted at no additional expense to the Owner.
 - 5. Recertification of the welder shall be made to Architects only after the welder has taken and passed the required retest. The Architect may require coupon to be cut from any location in any joint for testing. All sections of welds found

- defective shall be chipped or cut out to base metal and properly re welded before proceeding with the Work.
- a. Should any 2 coupons cut from the work of any welder show strengths that, under test, are less than that of the base metal, it will be considered evidence of negligence or incompetence, and such welder shall be permanently removed from the Work.
 - b. When coupons are removed from any part of a structure, the members cut shall be repaired, at no additional cost to the owner. Make repairs in a neat and workmanlike manner with joints of proper type to develop the full strength of the member and joint cut. Peen as necessary or directed to relieve residual stress.
6. Provide stress relieving of welded assemblies per Section 1.9.T for the joints at location indicated on plans.
 7. Storage and Care of Electrodes: Coating of low-hydrogen type electrodes shall be thoroughly dry as used. Conform to AWS D1.1. Use electrodes taken from hermetically sealed packages within the time limit specified therein after package is opened. Electrodes not used within allowable time period and electrodes that have been exposed more than one hour to air having a relative humidity of 75% or greater shall be dried according to AWS D1.1 before they are used or shall be reconditioned according to electrode manufacturer's recommendations. Electrodes so dried or reconditioned and not used within allowable time period shall be redried before use. Electrodes of any class that have been wet shall not be used under any conditions.
 8. Preparation: Clean surfaces to be welded of all paint, grease, oil, mill scale, and foreign matter. Clean weld each time the electrode is changed. Chip full surface of hand guided and controlled flame-cut edges before welding. Steel surfaces prepared with automatic or mechanically guided and controlled equipment need not be ground or chipped before welding.
 9. Procedures: During assembling and welding, hold components of a built-up member with adequate clamps, bolts, or other means to keep parts straight and in tight contact.
 - a. GMAW, FCAW-G, GTAW and EGW shall not be performed when the wind velocity in the immediate vicinity of the weld exceeds three miles per hour. Welding performed within an enclosed area, and not subject to drafts may be deemed to satisfy this requirement. SMAW, FCAW-S, AND SAW may be performed without limitation to wind velocity, provided the wind does not affect the appearance of the molten weld puddle. Cut out defective welding with chisel or air arc and replace.
 10. Maintain record of welding procedures, welders employed, date of qualification and identification symbol of mark. Submit at completion of Work, or upon request, certified copies of records.
 11. Related Welding: Conform to AWS D1.1 for fillet, plug, slot, partial or flared groove, and lap. Welding starts and stops do not count as part of the effective length of any weld.

12. Connection to embedments in Concrete and Masonry: Make welds to metal embedments installed in concrete or masonry construction with electrodes of size and by methods that will ensure against damage to adjacent construction due to heat input to and connection from embedded metal.
13. Weather Exposed Welds: Seal weld around entire connection where welds remain exposed to weather, in addition to required structural welding.
14. Welding Characteristics: Clean and wire brush all welds. Visual inspection of finished welds must show uniform section, smoothness of welded metal, feather edges without undercuts or overlays, freedom from porosity and inclusions, and good fusion and penetration into base metal at edges and ends of fillet welds.
15. Weld Finishing: Grind exposed welds to smooth surfaces free of holes, slag, or other defects, flush with adjoining surfaces. No finish treatment is required for permanently concealed welds.

P. Bolted Construction

1. Machine Bolts: Make connections with machine bolts only where indicated.
2. High-Strength Steel Bolting: For joints connected by high strength steel bolts, hardened washers, and nuts tightened to high tension, conform materials, methods of installation and tension control, and wrenches to Reference Standards.
 - a. Install all high-strength bolts under inspection required by CBC Chapter 17.
 - 1) Connections shall be the "slip critical" (SC) unless noted to be "bearing bolts type" (N or X).
 - 2) Minimum bolt lengths shall be per AISC. Manual of Steel Construction.
 - 3) Clean all contact surfaces of bolted parts and threads free of scale, slag, burrs, pits, dirt, paint, and other foreign material or defects which would prevent solid seating of connected parts.
 - 4) Install hardened washers per AISC Standards.
 - 5) Tighten bolts systematically from the most rigid part of connection to the free edges.
 - 6) Retighten first installed bolts that may have loosened by tightening of subsequent bolts, so all bolts are tightened to correct tension.
 - 7) Mark fully tightened bolts with identifying symbol.
3. Load Indicator Washers: Manufactured and licensed by Cooper and Turner, or equal, may be used for field installation of high-strength bolts. Load indicator washers do not replace required washers but may be used in conjunction with required washers. Conform tightening to Paragraph 5e of "Reference Specifications". After sufficient bolts in a joint are snugged to bring the members into close contact, perform tightening from most rigid part to free edges until load indicators on all bolts are closed to required gap of 0.015" under bolts heads or 0.010" under the nuts. Do not completely close the gap to prevent overtightening and damage to the bolts.
4. Tension Set or Load Indicator Bolts, Nuts, and Washers: As manufactured by Cold Form Specialties, or equal, may be used for the field installation of high-

strength bolts. In multi-bolts joints, tighten the nuts in stages (a little at a time) without breaking spline in any of them until final stage, to minimize slackening of the installed bolts.

Q. Space shear stud connectors at spacing indicated on the drawings.

R. Fabricate connections for bolt, nut, and washer connectors.

S. Develop required camber for members.

2.03 FINISH

A. General: Shop paint structural steel work, except as follows:

1. Steel surfaces embedded in concrete or masonry.
2. Structural steel which is completely closed-in by interior or exterior building finish.
3. Do not paint surfaces which are to be welded or high-strength bolted with slip critical (SC)-type connection.
4. Do not paint surfaces which are scheduled to receive sprayed-on fireproofing.

B. Prepare structural component surfaces in accordance with SSPC-Paint 20.

C. Shop paint all structural steel which will be exposed in the finished work.

D. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide a uniform dry film thickness of not less than 1.5 mils. Use painting methods which will result in full coverage of joints, corners, edges, and exposed surfaces.

E. Galvanize all steel exposed to weather per ASTM A123. Provide a minimum of 1.7 oz/sq ft. galvanized coating.

2.04 SOURCE QUALITY CONTROL AND TESTS

A. Provide shop testing and analysis of structural steel. Submit the following information:

1. Members to be tested: _____.
2. Percentage tested: _____.
3. Test method: _____.
4. Minimum result: _____.

B. High-Strength Bolts: Provide testing and verification of shop-bolted connections in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts", testing at least 25 percent of bolts at each connection.

- C. Welded Connections: Visually inspect all shop-welded connections and test at least 100 percent of welds using one of the following:
1. Radiographic testing performed in accordance with ASTM E 94.
 2. Ultrasonic testing performed in accordance with ASTM E 164.
 3. Liquid penetrant inspection performed in accordance with ASTM E 165.
 4. Magnetic particle inspection performed in accordance with ASTM E 709.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means the erector accepts existing conditions.

3.02 ERECTION

- A. General: Comply with AISC Specifications and Code of Standard Practice, and as herein specified.
- B. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.
- C. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete the work.
- D. Setting Bases and Bearing Plates: Furnish and deliver anchor bolts with setting drawings and templates. Verify position of bolts prior to delivery of steel; report errors or deviation for correction to the Architect.
 - 1. Clean concrete bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean the bottom surface of base and bearing plates.
 - 2. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
 - 3. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
- E. Field Assembly: Set structural frames accurately to lines and elevations. Align and adjust various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure within specified tolerances.
 - 2. Splice members only where indicated and accepted on final shop drawings.
 - 3. Do not enlarge unfair holes in members by burning or by use of drift pins except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
 - 4. All back-up bars, dams, and runoff tabs shall be removed: the weld, base metal shall be ground flush and smooth per AWS.

- F. Gas Cutting: Do not use gas cutting torches in the field for correcting fabrication errors in structural framing. Cutting will be permitted only on secondary members which are not under stress. Finish gas-cuts sections equal to a sheared appearance when permitted.
- G. Damaged Members: Remove members damaged to an extent impairing appearance, strength, or serviceability, as determined by architect and replace with new members at no extra cost to the owner.
- H. Grouting of Base Plates and Bearing Plates
 - 1. Plates shall be set and anchored to the proper line and elevation. Metal wedges, shims and/or setting nuts shall be used for leveling and plumbing the structural members, including plumbing of columns. Concrete surfaces shall be rough, clean, free of oil, grease, and laitance, and shall be damp. Metal surfaces shall be clean and free of oil, grease, and rust. The addition of water, mixing and placing, shall be in conformance with the material manufacturer's instructions. Grout shall be mixed by using a mortar mixer. Batches shall be of size to allow continuous placement of freshly mixed grout. Placing shall be quick and continuous. Exposed surfaces shall have smooth, dense finish. Fill grout space solid with non-shrink grout.
 - 2. Base plates shall be grouted prior to the placement of structural concrete slabs and/or concrete fill on metal decks.
- I. Field Touch-up Painting: After structural steel erection and connections are completed, inspected, and approved, clean all connections to be painted and damage to shop painted surfaces, and apply a field touch-up coat of same primer used for shop coat.

3.03 TOLERANCES

- A. Erect members to the tolerances conforming to referenced AISC Standards except as follows:
 - 1. Vertical Dimensions: Measured from top of beams at their connections at any column, variation not more than 1/4" plus or minus per story or, when variations are accumulative from floor to floor, not exceeding 3/8" per story exclusive of column shortening due to dead load.
 - 2. Plumb Displacement: Center line of columns from established column line, no more than 1" toward or away from established center line.
 - 3. Floor Elevation: Top of steel elevation for floor elevation will be considered level if on any one floor, all beam connecting to column at the column connections do not vary more than 3/8" plus or minus. See Section 03 31 00 "Structural Concrete Work" for concrete finishing.
 - 4. Horizontal Dimension Variances: Governed by specified column plumb displacement.

3.04 QUALITY CONTROL – SHOP AND FIELD

- A. The Owner will engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports in accordance with applicable governing codes.
- B. Testing Agency shall conduct and interpret test and state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.
- C. Provide access for testing agencies to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished safely.
- D. The testing agency may inspect structural steel at the plant before shipment; however, Architect reserves the right at any time before final acceptance to reject material not complying with specified requirements.
- E. Correct deficiencies in structural work which inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any non-compliance of original work, and as may be necessary to show compliance of corrected work.
- F. Welding: Inspect and test during fabrication and erection of structural steel assemblies, as follows:
 - 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in the work. Record work required and performed to correct deficiencies.
 - 2. Inspect all welds. All welds shall be accepted visually prior to performing any non-destructive testing. Groove weld shall be inspected by ultrasonic or other approved non-destructive test methods. All testing shall be performed to AWS D1.1 Table 6.3 cyclically loaded non tubular connections.
 - 3. Ultrasonic testing shall be performed by a specially trained and qualified technician who shall operate the equipment, examine welds, and maintain a record of welds examined, defects found, and disposition of each defect. All defective welds shall be repaired and costs for retesting defective welds shall be paid by Contractor.
 - 4. Rate of Testing: All completed welds contained in joints and splices shall be tested 100 percent either by ultrasonic testing or by radiography.
 - 5. All welds when used in column splices shall be tested either by ultrasonic testing or radiography.

6. Base metal thicker than 1 1/2 inches, when subjected to through-thickness weld shrinkage strains, shall be ultrasonically inspected by shear wave methods for discontinuities directly behind such welds. Tests shall be performed not less than 48 hours after completed joint has cooled down to ambient air temperature.
7. Any material discontinuities shall be accepted or rejected on the basis of the defect rating in accordance with the criteria of AWS D1.1 Table 6.3 by the Architect.
8. Welds inspected by visual or ultrasonic testing or any other approved method that does not meet the requirements of AWS D1.1 shall be repaired or replaced as prescribed by AWS D1.1 repairs to confirmed repair work. Additional testing of repaired or replaced areas shall be made at the Contractor's expense.
9. Should defects appear in base metal and/or in welds tested, repairs of defects in base metal or welds shall be similarly inspected, as approved by architect at the Contractor's expense until satisfactory performance is assured.
10. Other methods of non-destructive testing and inspection, for example, liquid dye penetrant testing, magnetic particle inspection or radiographic inspection, may be used on weld if required.
11. Lamellar Tearing: Lamellar tearing resulting from welding is a crack (with zero tolerance) and shall be repaired per AWS D1.1.
12. Lamination: Laminations are defects in the base metal. The rejection criteria shall be based on ASTM A 435.
13. Where lamination or conditions of lamellar tearing in base metal are revealed by testing, the steel fabricator shall submit a proposed method of repair for approval. Retesting of repaired areas is required. Costs of repair and retesting shall be borne by the Contractor.
14. Magnetic Particle Testing: Magnetic particle testing when required shall be provided in accordance with AWS D1.1 for procedure and technique. The standards of acceptance shall be in accordance with AWS D1.1 - Qualification.
15. Inspection of Stress Relieving Process: See Section 1.6.T.

G. Lamellar Tearing: See Section 1.6.0.5.

H. Prior Testing of Base Material: Test material prior to fabrication in order to detect possible defects that would require difficult and expensive repair.

I. Lines and levels of erected steel to be certified by a licensed surveyor. See additional requirements in Division 1 Sections.

J. Welded studs shall be tested and inspected by the owner's testing laboratory in accordance with the requirements of AWS D1.1 - Stud Welding.

K. As erected Drawings: After all steel has been erected, correct or revise shop drawings and erection diagrams to correspond with the changes made in the field.

- L. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts".

END OF SECTION 05 12 00

METAL FABRICATIONS

SECTION 05 50 00

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1.
2. Steel framing and support for mechanical and electrical equipment.
3. Steel framing and support for applications where framing and supports are not specified in other Sections.
4. Steel weld plates and angles for casting into concrete not specified in other Sections.
5. Submittal preparation.
6. Clean up.

B. Related Sections:

1. Section 03 31 00 Structural Concrete Work.
 - a. Installing anchor bolts, steel pipe sleeves, wedge-type inserts and other items indicated to be cast into concrete.
2. Section 04 22 00 Reinforced Concrete Unit Masonry.
3. Section 05 12 00 Structural Steel Framing.
4. Section 05 55 00 Metal Stair Treads and Nosings
5. Section 05 52 13 Pipe and Tube Railings
6. Section 09 21 16 Gypsum Board Assemblies
 - a. Metal backing anchoring railings.
7. Section 09 91 13 Exterior Painting
8. Section 09 91 23 Interior Painting

1.02 REFERENCES

A. ASTM International (ASTM)

1. ASTM A36/A36M – Standard Specification for Carbon Structural Steel.
2. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
3. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
4. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
5. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
6. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
7. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

8. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
9. ASTM A1011/A1011M - Standard Specification for Steel, Sheet, and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
10. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
11. ASTM C1107/C1107M – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
12. ASTM D1187 – Standard Guide for Establishing Surveillance Test Program for Boron-based Neutron Absorbing Material Systems for Use in Nuclear Fuel Storage Racks in Pool Environment.

1.03 SUBMITTALS

- A. See Section 01 30 00 “Administrative Requirements” for submittal procedures.
- B. Product Data: For the following:
 1. Metal bar gratings.
 2. Paint products.
 3. Grout.
 4. Metals.
- C. Shop Drawings: Show fabrication and installation details for metal fabrications.
 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 2. Provide templates for anchors and bolts specified for installation under other Sections.
- D. Welding certificates.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Welding: Qualify procedures and personnel according to the following:
 1. AWS D1.1, "Structural Welding Code-Steel."
 2. AWS D1.3, "Structural Welding Code-Sheet Steel."
 3. AWS D1.6, "Structural Welding Code-Stainless Steel."

1.05 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls, structural components, and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.
 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous

- construction to ensure that actual dimensions correspond to established dimensions.
2. Provide allowance for trimming and fitting at site.

1.06 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

2.02 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.03 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- B. Steel Tubing: ASTM A500, cold-formed steel tubing.
- C. Steel Pipe: ASTM A53/A53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
 1. Provide galvanized finish for exterior installations where indicated.
- D. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with MFMA-3.
 1. Size of Channels: As indicated on drawings.

- E. Cast Iron: ASTM A48/A48M, Class 30, unless another class is indicated or required by structural loads.
- F. Iron Castings: Either gray or malleable iron, unless otherwise indicated.
- G. Galvanized Steel Sheet: ASTM A653/A653M, G90 coating, structural steel, Grade 33, unless another grade is required by design loads.
- H. Wire Rod for Grating Main Runner and Crossbars: ASTM A1011 Carbon Steel.

2.04 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

2.05 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with Sections 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting".
- C. Galvanizing Repair Paint: High-zinc-dust-content paint for re-galvanizing welds in steel, complying with SSPC-Paint 20.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.
- E. Non-shrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications. Do not use in wet areas or on exterior.
- F. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.06 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where less conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated in drawings.

2.07 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts if units are installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports where indicated.

2.08 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with not less than two integrally welded steel strap anchors for embedding in concrete.

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METAL FABRICATIONS

2.09 METAL BAR GRATINGS

- A. Design Loads for Grating and Connections:
 - 1. Horizontal Applications: All metal bar grating used in horizontal applications shall be designed for a vertical applied live and dead load of 73 lbs. per square foot and maximum deflection of 0.298". Combined point live and dead load of 145 lbs. in accordance with the latest edition of the California Building Code.
 - 2. Vertical application of grating for fence screens shall be designed for horizontal lateral loads in compliance with the latest edition of the California Building Code.
- B. Refer to Drawings for supporting members and sizes.
- C. Grating Materials:
 - 1. Materials for bearing bars and cross bars shall be:
 - a. 1011 carbon steel.
 - b. Allowable fiber stress: 18,000 psi.
 - c. Modulus of elasticity: 29,000,000 psi.
- D. All fasteners for grating systems shall be stainless steel.
- E. Finish metal bar grating panels after fabrications and after panel assembly with:
 - 1. Powder coat primer and powder coat finish per manufacturer's instructions.
 - 2. Colors: As selected by Architect from manufacturer's standard current color schemes

2.10 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.11 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A123/A123M, for galvanizing steel and iron products.
 - 2. ASTM A153/A153M, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications.
- C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercutting or overlapping.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smoothly and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.02 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirement indicated on Shop Drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

3.03 INSTALLING METAL BAR GRATINGS

- A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.

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METAL FABRICATIONS

3.04 ADJUSTING AND CLEANING

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in painting Sections 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting".
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 50 00

**PIPE AND TUBE RAILINGS
SECTION 05 52 13**

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1.
2. Pipe handrails and guardrails.
3. Hot dip galvanizing, exterior railings.
4. Shop priming, interior railings.
5. Cast handrail wall brackets.
6. Submittal preparation.
7. Clean up.

B. Related Sections:

- | | |
|---------------------|--------------------------|
| 1. Section 03 21 00 | Reinforcing Steel |
| 2. Section 03 31 00 | Structural Concrete Work |
| 3. Section 06 10 00 | Rough Carpentry |
| 4. Section 09 91 13 | Exterior Painting |
| 5. Section 09 91 23 | Interior Painting |
| 6. Section 32 13 13 | Site Concrete |

1.02 SUBMITTALS

A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.

B. Shop Drawings or Layout Drawings:

1. Submit shop drawings indicating materials, layout, and attachment of railings to Architect for review and approval prior to starting work.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Workmen shall be skilled in this type of steel fabrication and erection.
2. Welders shall be qualified by tests prescribed in the "Standards Qualification Procedure" of the AWS.

PART 2 PRODUCTS

2.01 MATERIALS

A. Pipe rails shall be Schedule 40 standard steel pipe.

1. Size per drawings.
2. Hot Dip Galvanize after fabrication per ASTM A123, Grade 75.
 - a. Interior pipe rails shall not be galvanized.

3. Shop priming shall meet Fed Spec TT-P-86, Type II; Sherwin Williams Procryl Metal Primer or equal.
 - a. Exterior pipe shall not be primed.
 4. Galvanized finish repair:
 - a. Repair compound: ASTM D520, Type III high purity grad zinc dust. 24 lbs. lbs./gallon minimum weight per gallon.
 - 1) 52% by volume minimum solids content.
 - 2) 94% by weight in dry film minimum metallic zinc content.
 - 3) Galvilite Galvanizing Repair, ZRC Worldwide (800) 831-3275.
- B. Cast Handrail Wall Brackets:
1. Malleable Iron:
 - a. Quality Standard: Style P-3 by R&B Wagner, Inc.
 2. Hot Dip Galvanize after fabrication per ASTM A-123, Grade 75.
 3. Shop priming shall meet Fed Spec TT-P-86, Type II; Sherwin-Williams Procryl Metal Primer or equal.
 4. When installed on wall to receive exterior cement plaster finish, install plaster filler.
 - a. Quality Standard: Style PF-3 by R&B Wagner, Inc.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify all required backing and blocking prior to enclosing framing.
- B. Verify framing or surfaces are acceptable prior to installing finish materials.
- C. Verify all dimensions, including grade elevations.
- D. Verify detail of existing field conditions.
 1. Coordinate adjustments for existing conditions with Architect prior to performing work.

3.02 FABRICATION

- A. Layout:
 1. Fabrication shall be of welded construction in the largest assemblies feasible to fit into the hot dip tanks. Minimize number of field welds after the hot dip process.
 - a. Re-entrant corners shall be shaped to a notch-free radius of at least one-half inch (1/2").
- B. Railings and Handrails:
 1. Handrails for stairs and ramps shall be 1-1/4" to 1-1/2" diameter (1-1/2" nominal) and mounted 1-1/2" clear from side walls. CBC Section 11B-505.7 (cross section) and 11B-505.5 (clearance).

2. All welded joints and surfaces shall be ground smooth, no sharp or abrasive corners, edges, or surfaces. Wall surfaces adjacent to handrail shall be smooth. CBC Section 11B-505.8 (surfaces).

C. Welding:

1. Welding shall be done by the electric shielded arc process.
2. Conform to the requirements of the latest edition of the AISC "Specification for the Design, Fabrication and Erection of Structural Steel Buildings".
3. Conform to Section 3 and 4 of the AWS "Structural Welding Code D1.1".
4. Electrodes shall be E-70 AWS.

D. Cutting:

1. Gas cutting shall be done by machine wherever possible.

E. Bolted Connections:

1. Bolt holes shall be one-sixteenth inch (1/16") larger than the nominal diameter of the bolt.
 - a. Holes may be punched if the thickness of the material is less than the nominal diameter plus one-eighth inch (1/8").
 - b. Holes shall be drilled or sub-punched and reamed if the thickness of the material is greater than the nominal diameter plus one-eighth inch (1/8").

F. Painting:

1. Shop Coating for Interior Hand and Guard Rails:
 - a. Cleaning shall conform to the Steel Structures Painting Council Surface Preparation Specifications as follows:
 - 1) Solvent cleaning: SSPC - SP1.
 - 2) Power tool cleaning: SSPC - SP3.
 - 3) Commercial blast cleaning: SSPC - SP6.
 - b. Apply one coat of shop primer per the manufacturer's recommendations.
2. Galvanizing for Exterior Hand and Guard Rails:
 - a. Galvanizing shall be performed by the hot-dip process after fabrication.
 - b. Galvanize in the largest practical sections.
 - c. Galvanizing shall conform to ASTM A123.
 - 1) Where specified for small structural steel or cast steel articles galvanizing shall be performed after fabrication in accordance with ASTM A153.
 - 2) Repair all damaged galvanized material with approved/specified repair material. Manufacturer's requirements for prep and application shall be strictly followed.

3.03 INSTALLATION OR APPLICATION

- A. Connections:
 - 1. Bolts shall be zinc-plated machine bolts, unless otherwise noted.
 - 2. Field welding shall meet all fabrication requirements listed above.
 - a. Grind off zinc plating at point of connections prior to welding where required.
 - b. After welding, all joints shall be ground smooth, degreased, and touch up galvanized with a 100% zinc compound.
 - 3. Cast Handrail Brackets:
 - a. Attached to structure with lag bolts as detailed on Drawings.
 - 1) Use lag-screw expansions shields when attaching brackets to concrete.

3.04 QUALITY CONTROL

- A. Tolerances:
 - 1. Tolerances shall be as set forth in the latest edition of the AISC "Specification for the Design, Fabrication and Erection of Structural Steel Buildings".
 - 2. Handrails shall be set true-to-line and parallel to the slope of the walk or tops of nosing within 1/4" of dimensions indicated on the plans.

3.05 CLEANING OR REPAIR

- A. Clean and straighten material before fabrication.
 - 1. Remove scale and rust.
- B. Correct deformations resulting from fabrication processes.
 - 1. Heat shrinkage of low alloy structural steels will be permitted.

3.06 CONDITION OF FINISHED WORK

- A. Handrails shall have returns to within 1/2" of the adjacent wall or closed returns to supporting pipes.
- B. Handrails shall have welded end closures.
- C. Edges shall be ground smooth and free of sharp edges.
- D. Pipe splicing and butt joints shall be welded using beveled end welds.
 - 1. Grind smooth top to totally conceal weld.
- E. No sandpaper marks, hammer marks or blemishes will be allowed.

END OF SECTION 05 52 13

ROUGH CARPENTRY SECTION 06 10 00

PART 1 GENERAL

1.01 SUMMARY

- A. Provisions set forth in Divisions 0 and 1;
 - 1. Structural framing.
 - 2. Floor, wall, and roof sheathing.
 - 3. Preservative treatment of wood.
 - 4. Fire retardant treatment of wood.
 - 5. Miscellaneous framing and sheathing.
 - 6. Telephone and electrical panel boards.
 - 7. Wood nailers and curbs for roofing and items installed on roof.
 - 8. Roofing cant strips.
 - 9. Concealed wood blocking for support of toilet and bath accessories, wall cabinets, wood trim, markerboards/tackboards, projector screens, etc.
 - 10. Miscellaneous wood nailers and furring strips.
- B. Related Sections
 - 1. Section 05 12 00: Structural Steel
 - 2. Section 05 50 00: Metal Fabrications
 - a. Miscellaneous steel connectors and support angles for wood framing.
 - 3. Section 06 17 00: Shop-Fabricated Structural Wood.
 - 4. Section 06 18 00: Glued-Laminated Construction.
 - 5. Section 07 62 00: Sheet Metal Flashing and Trim
 - a. Sill flashings.

1.02 REFERENCES

- A. American Forest & Paper Association (AFPA)
 - 1. AFPA T10 - Wood Frame Construction Manual; American Forest and Paper Association.
- B. American National Standards Institute (ANSI)
 - 1. ANSI A208.1 - American National Standard for Particleboard.
- C. ASTM International (ASTM)
 - 1. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 2. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

3. ASTM D 2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing.
 4. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- D. American Wood Protection Association (AWPA)
1. AWP C2 - Lumber, Timber, Bridge Ties and Mine Ties -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association.
 2. AWP C9 - Plywood -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association.
 3. AWP C20 - Structural Lumber -- Fire Retardant Treatment by Pressure Processes; American Wood-Preservers' Association.
 4. AWP C27 - Plywood -- Fire-Retardant Treatment by Pressure Processes; American Wood-Preservers' Association.
 5. AWP U1 - Use Category System: User Specification for Treated Wood; American Wood-Preservers' Association.
- E. American Softwood Lumber Standard (ALSC)
1. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce).
- F. Redwood Inspection Service (RIS)
1. California Redwood Lumber RIS (GR) - Standard Specifications for Grades of California Redwood Lumber.
- G. Southern Pine Inspection Bureau, Inc. (SPIB)
1. SPIB (GR) - Grading Rules; Southern Pine Inspection Bureau, Inc.
- H. West Coast Lumber Inspection Bureau (WCLB)
1. WCLB (GR) - Standard Grading Rules for West Coast Lumber No. 17.
- I. Western Wood Products Association (WWPA)
1. WWPA G-5 - Western Lumber Grading Rules.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.
- C. Shop Drawings and Calculations: For site fabricated truss frames, indicate dimensions, wood species and grades, component profiles, drilled holes, fasteners, connectors, details, and sequence of erection. Drawings and calculations must be signed and stamped by the Professional Engineer responsible for the design.

- D. Samples: For rough carpentry members that will be exposed to view, submit two samples, 12" x 12" in size illustrating wood grain, color, and general appearance.
- E. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.04 QUALITY ASSURANCE

- A. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.
 - 1. Acceptable Lumber Inspection Agencies: Any agency with rules approved by American Lumber Standards Committee.
- B. Exposed-to-View Rough Carpentry: Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- C. Fire-Retardant Treated Wood: Mark each piece of wood with the producer's stamp indicating compliance with specified requirements.
- D. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWWA standards.

1.05 QUALIFICATIONS

- A. Design structural site fabricated trusses under direct supervision of a Professional Engineer experienced in design of such trusses and licensed in the state in which the project is located.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Trusses: Protect site fabricated trusses from warping or other distortion by stacking in vertical position, braced to resist movement.
- C. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 DIMENSION LUMBER

- A. Sizes: Nominal sizes as indicated on drawings.
- B. Moisture Content: Provide seasoned lumber with 19% maximum moisture content.

- C. Structural Framing:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
- D. Miscellaneous Blocking, Furring and Nailers:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.02 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere. Type as indicated on drawings.
 - 2. Furnish bolts and attachments to other trades for installation in masonry and concrete work.
 - 3. Nails: Common wire, galvanized for exterior use.
 - 4. Lag Screws and Wood Screws: Steel. Conforming to ANSI/ASME Standard B18.2.1, galvanized for exterior use.
 - 5. Machine Bolts: ASTM A307, galvanized for exterior use.
 - 6. Plain Washers: ANSI B18.22, galvanized for exterior use.
 - 7. Hangers, Straps, Ties and other Framing Connectors: Steel, Galvanized. "Simpson Strong-Tie" unless noted otherwise.
- B. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.
- C. Sill Flashing: As specified in Section 07 62 00 "Sheet Metal Flashing and Trim".
- D. Subfloor Glue: Waterproof, water base, air cure type, cartridge dispensed.
- E. Building Paper: No. 15 asphalt felt.

2.03 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
- B. Fire Retardant Treatment:
 - 1. Manufacturers/Products:
 - a. Arxada Arch Wood Protection, Inc: www.arxada.com.com.
 - 1) FRX (exterior applications).
 - 2) Dricon FS (Interior applications).
 - b. Hoover Treated Wood Products, Inc.: www.frtw.com.
 - 1) ExteriorFireX (exterior applications).
 - 2) PyroGuard (interior applications).

- c. Osmose, Inc. (www.osmose.com).
 - 1) Osmose Fire-Guard (exterior and interior lumber).
 - d. Substitutions: See Section 01 60 00 "Product Requirements".
 - 2. Exterior Type: AWWA Use Category UCFB, Commodity Specification H (Treatment C20 for lumber and C27 for plywood), chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E 84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D 2898.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat rough carpentry items as indicated.
 - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.
 - 3. Interior Type A: AWWA Use Category UCFA, Commodity Specification H (Treatment C20 for lumber and C27 for plywood), low temperatures (low hygroscopic) type chemically treated, and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance for an additional 20 minutes.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat rough carpentry items as indicated.
 - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.
- C. Preservative Treatment:
- 1. Manufacturers:
 - a. Arxada Arch Wood Protection, Inc: www.arxada.com.com.
 - 1) Wolman E:
 - b. Viance, LLC.; www.treatedwood.com.
 - 1) Product TimberSaver PT.
 - c. Substitutions: See Section 01 60 00 "Product Requirements".
 - 2. Preservative Pressure Treatment of Lumber Above Grade: AWWA Use Category UC3B, Commodity Specification A (Treatment C2) using waterborne preservative to 0.25 lbs/cu ft retention.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber in contact with roofing, flashing, or waterproofing.
 - c. Treat lumber in contact with masonry or concrete.
 - d. Treat lumber less than 18 inches above grade.

- e. Preservative Pressure Treatment of Plywood Above Grade: AWWPA Use Category UC2 and UC3B, Commodity Specification F (Treatment C9) using waterborne preservative to 0.25 lb/cu ft retention.
 - 1) Kiln dry plywood after treatment to maximum moisture content of 19 percent.
 - 2) Treat plywood in contact with roofing, flashing, or waterproofing.
 - 3) Treat plywood in contact with masonry or concrete.
 - 4) Treat plywood less than 18 inches above grade.
 - 5) Treat plywood in other locations as indicated.
- 3. Preservative Pressure Treatment of Lumber in Contact with Soil: AWWPA Use Category UC4A, Commodity Specification A (Treatment C2) using waterborne preservative to 0.4 lbs/cu ft retention.
 - 1. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
 - 2. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.01 FRAMING INSTALLATION

- A. Verify that surfaces to receive rough carpentry materials are prepared to require grades and dimensions.
- B. Conduct work under direction of capable experienced foreman.
- C. Accurately located members to line and dimension. Ensure full contact of timbers framed together. Ensure let-in members in full contact on two surfaces. Where there is a significant variation in moisture content between individual members, shrinkage shall be allowed for and final connection shall not be made until moisture content of adjacent members has been stabilized. Allow no construction over framing members until final connections and/or adjustments have been made to achieve maximum strength at connections and maximum future movement from shrinkage or expansion.
- D. Cutting: Do all cutting and framing required to accommodate structural members, piping conduit, ducts and installation of mechanical, electrical, and other equipment and apparatus.
 - 1. Obtain Architect's approval for cutting of structural members not detailed on structural drawings.
 - 2. Reinforce cut sill and top plates with metal straps in accordance with the requirements of the drawings.
- E. Bracing and Shoring: Provide all supports, guys and braces, required to stabilize structure during construction.

- F. Accurately saw-cut and fit lumber into position and securely nail, spike, lag bolt, or bolt as required.
- G. Fasteners: Installation of fasteners shall be performed in accordance with ANSI/ASME Standard B18.6.1. Drill holes for fasteners and size as noted:
 - 1. Nails and spikes: Smaller than diameter of fastener. Predrill as required to prevent splitting.
 - 2. Lag Bolts: Drill holes same length as shank. Bit size no larger than base of threaded portion of screw.
 - 3. Bolts: Holes 1/32" - 1/16" larger than bolt.
 - 4. Framing Connectors: Smaller than diameter of fastener. Predrill as required to prevent splitting.
 - 5. No lubricant of any kind shall be used on any fastener depending on friction for holding.
- H. Nailing: Refer to details and tables on drawings for specific nailing requirements. In absence of specific instruction, comply with the following:
 - 1. Edge Distance: 1/4 length of fastener.
 - 2. Toe Nailing: Drive toe nails at an angle or approximately thirty degrees with the piece and started approximately one-third the length of the nail from end of piece.
 - 3. Replace split or otherwise damaged structural members.
- I. Bolts: Use standard cut washer under bolt heads and nuts against wood. Use heavy plate washer or malleable iron washer where noted on drawings. Drive into place. Ensure full engagement of nut, but projection of bolt beyond nut not to exceed one bolt diameter. Tighten nuts at installation and again immediately prior to enclosure.
- J. Lag Screws: Lubricate with soap or similar material. Turn into place without driving. Ensure penetration into lagged member of 60 percent of screw length. Lead hole shall have diameter of about 70 percent of the root diameter of the screw. Provide washers of same sizes as specified for bolts.
- K. Framing Connectors: Drive nails into all holes of each connector. Install all bolts in each framing connector unless detailed otherwise.
- L. Screws: Screws shall not be driven by hammering.
- M. Frame openings with two or more studs at each jamb and support headers on cripple studs unless noted otherwise in the drawings.
- N. Provide miscellaneous members as indicated or as required to support finishes, fixtures, specialty items, and trim.

3.02 INSTALLATION OF ACCESSORIES AND MISCELLANEOUS WOOD

- A. Place full width continuous sill flashings under framed walls on cementitious foundations. Lap flashing joints 4 inches and seal.
- B. Place sill gasket directly on sill flashing. Puncture gasket cleanly and fit tightly to protruding foundation anchor bolts.
- C. Coordinate installation of wood decking, wood chord metal joists, glue laminated structural units, prefabricated wood trusses, and plywood web joists.
- D. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.
- E. Coordinate curb installation with installation of decking and support of deck openings.

3.03 SILLS AND PLATES

- A. Install Pressure Preservative-treated lumber for plates and sill in contact with concrete or masonry construction.
- B. Bolt to foundations and slabs. Level sill with shims, washers placed, and nuts tightened to level bearing.
- C. Pack space between sill and concrete with non-shrink grout.

3.04 STUD WALLS, PARTITIONS AND FURRING

- A. Provide studs in continuous lengths without splices.
- B. Plates: Provide single bottom plate and double top plate. Stagger joints 4' minimum in top plates.
- C. Nail or anchor plates to supporting construction.
- D. Corners and Intersections: Frame with 3 studs or as detailed in the drawings.
- E. Openings: Frame with double studs each side and double headers placed on edge, resting on cripple studs.
- F. Provide continuous horizontal blocking row at mid-height of single-story partitions over 8' high and at midpoint of multi-story partitions, using 2" thick members of same width as wall or partitions.

- G. Cut-in blocks wherever necessary for bracing or backing for applied finish or fixtures. Cut-in 2" solid blocking between studs at all horizontal joints in non-structural plywood wall sheathing.

3.05 FLOOR FRAMING

- A. Girders, Posts, Ledgers, and Anchors: Set accurately and secure with level bearings. Coordinate work with Cast-in-Place Concrete Contractor to set bolts and anchors properly
- B. Floor Joists: Lay with crowning edge up, with 1-1/2" minimum bearing at supports except, at ledgers, full width of ledger.
- C. Blocking: Provide 2" solid blocking of same depth as joist at all walls and partitions.
- D. Bridging: Provide bridging for floor joists of more than 4" depth which are spaced 32" on center or less. Bridge floor joists every 8' by solid blocking 2" thick and full depth of joist or by wood cross bridging of not less than 1"x3" or nailed metal cross bridging of equal strength. Where cross bridging is used, drive lower ends of such cross bridging up and nail after floor or subfloor has been nailed.
- E. Piping: Where partitions containing plumbing, heating, or other piping occur above joists, space joists to give clearance for piping. Where partition containing piping runs parallel to floor joists, double joists below partition spaced to permit passage of pipes, and solid bridged.
- F. Joist: Double header joists and hang on steel joist hangers. Hang joists on steel joist hangers, Double trimmer joists receiving header joists over 6' long.

3.06 JOISTS AND RAFTERS

- A. Joists and Rafters: Lay with crowning edge up with full end bearing.
- B. Openings: Frame for hatches, vents, and other openings as required.
- C. Bridging: Provide bridging for roof joists or rafters of more than 8" which are spaced 32" on center or less. Bridge roof joist or rafters every 10' by solid blocking 2" thick and full depth of joist or rafter, or by wood cross bridging of not less than 1"x3" or nailed metal cross bridging of equal strength. Where cross bridging is used, drive lower ends of such cross bridging up and nail after roof sheathing has been nailed.
- D. Solid Blocking: Install between roof rafters and ceiling joists over partitions and at end supports as indicated.

- E. Plywood Roof Sheathing: Install plywood over rafters or decking as indicated on drawings. Thickness and nailing shall be as indicated on structural drawings.
- F. Plywood Joints: Install 1/2" H clips at butt joints of roof sheathing, between rafters spaced 24" on center where solid blocking is not required.

3.07 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

3.08 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.
- C. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

END OF SECTION 06 10 00

**ENGINEERED WOOD PRODUCT
SECTION 06 17 00**

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Engineered wood products.
 - a. Laminated Veneer Lumber (LVL).
 - b. Wood-I-Joist with wood flanges and web.
 - 3. Submittal preparation.
 - 4. Clean up.
- B. Related Sections:
 - 1. Section 05 12 00 Structural Steel
 - 2. Section 06 10 00 Rough Carpentry
 - 3. Section 06 18 00 Glue Laminated Construction
 - 4. Section 06 20 00 Finish Carpentry

1.02 REFERENCES

- A. American Wood Protection Association (AWPA)
 - 1. AWPA U1-15, U2 Interior/Damp Use.
- B. ASTM International (ASTM)
 - 1. ASTM E518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus (R-Value).
- C. ICC Evaluation Services

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data: Submit manufacturer's current published data including materials and installation instructions.
- C. Shop Drawings: Submit detailed drawings including details and dimensions for each product indicated in Drawings.

1.04 QUALITY ASSURANCE

- A. General:
 - 1. Engineered wood products shall have current model code evaluation/research reports that are acceptable to authorities having jurisdiction and that evidence

compliance for the application indicated with specified requirements and the building code in effect for this Project.

a. Identification Markings:

- 1) Each member shall be stamped with an identifying mark showing the ICC-ESR Evaluation Number and the manufacturer logo.

B. Laminated Veneer:

1. Lumber manufactured by laminating wood veneers in a continuous press using an exterior-type adhesive complying with ASTM D2559 to produce members with grain of veneers parallel with their lengths and complying with the following requirements:

a. Veneer Characteristics:

- 1) Douglas fir or southern pine veneers of varying thickness by widths and lengths standard with manufacturer, end-jointed with a tap-joint, butt joint, or scarf joint.

C. Allowable Design Stresses (LVL):

1. As follows, determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing laboratory:
 - a. Extreme Fiber Stress in Bending (Fb): 2600 psi
 - b. Modulus of Elasticity (E): 1,900,000 psi.
 - c. Tension Parallel to Grain (Ft): 2310 psi.
 - d. Compression Parallel to Grain (Fc): 2800 psi.
 - e. Compression Perpendicular to Grain: 400 psi and 750 psi perpendicular and parallel to glue line.
 - f. Horizontal Shear (Fv): 258 psi and 190 psi perpendicular and parallel to glue line.

PART 2 PRODUCTS

2.01 MANUFACTURERS/PRODUCTS

A. Subject to compliance with requirements, materials that may be incorporated into the work include, but are not limited to, the following:

1. Laminated Veneer Lumber:

a. Headers, beams and columns:

- 1) MICRO-LAM LVL; Truss Joist Corporation/Weyerhaeuser.
 - a) ICC-ES VAR-1008.
- 2) 2.0E REDLAM LVL; Redbuilt LLC.
 - a) ICC ESR-2993.
- 3) Or approved equal.

- b. Wood-I-Joist:
 - 1) TJI JOISTS; Truss Joist Corporation/Weyerhaeuser.
 - a) ICC-ES VAR-1008
 - 2) RED-I JOISTS; Redbuilt LLC.
 - a) ICC ESR-2994
 - 3) Or approved equal.

PART 3 EXECUTION

3.01 INSPECTION

- A. Continuous independent inspection of prefabricated wood lumber fabrication is not required. Ongoing quality control (QC) testing shall meet the requirements of ICC AC14, which includes the minimum requirements of ASTM D5055, Sections 8, 9, and 10. All quality control audits in compliance with Appendix B of ICC-ES AC14, resulting from unannounced audits by a third party auditor of a qualified third party inspection agency must be maintained by the manufacturers and made available to the Architect upon request.
- B. Where applicable, all plywood, lumber, and/or OSB material used on the fabrication of prefabricated wood products shall be grade stamped by an acceptable grading agency.
- C. The installer must examine the substrates and supporting structure and the condition under which the carpentry work is to be installed and notify the Contractor in writing of conditions detrimental to the work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- D. Visually graded lumber that is cut or ripped to a smaller normal size shall be re-graded by a qualified lumber grader prior to use.

3.02 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store members with care, and in accordance with manufacturer's instructions and recommendations to avoid damage from bending, overturning, or other cause for which member is not designed to resist or endure. Protect members from weather with factory applied protective covering until erected.
- B. Time delivery and erection of members to avoid delaying work of other trades whose work must follow erection of members.
- C. Members shall be properly wrapped for shipment and storage.

3.03 INSTALLATION

- A. Discard units of material with defects that impair quality work, and units that are too small to use in fabricating work with minimum joints or optimum joint arrangement.
- B. Set carpentry work accurately to required levels and lines, with members plumb and true and accurately cut and fitted.
- C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
- D. Make tight connections between members. Install fasteners without splitting wood: pre-drill as required.
- E. Install prefabricated wood products following the contract documents, approved shop drawings, and manufacturer's instructions.
- F. Do not install prefabricated wood products until supporting construction is in place and is braced and secured.
- G. Hoist prefabricated wood products in place by lifting equipment suited to sizes and types of members required, exercising care not to damage members by out-of-plane bending or other causes.
- H. Install members plumb, square, and true to line and securely fasten to supporting construction.
- I. Space, adjust, and align members in location before permanently fastening.
- J. For floors and roof framing, provide one row of bridging at mid-span for spans over 16 feet, where joist's depth is 16 inches or greater or where the live load exceeds 40 pounds per square foot.
- K. Provide connection to support immediately after setting members as detailed on Structural Drawings. Install bridging, blocking, and connections following manufacturer's recommendations and as shown on drawings as erection progresses and before construction loads are placed on framing members.
- L. Align top chord of joist members between supports by temporary lateral bracing until the sheathing is nailed into place.
- M. Return members that are damaged or do not meet requirements to fabricator and replace with joists that do not meet requirements.
 - 1. Do not alter members in the field.

3.04 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

- A. Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.
- B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Where occurs, build into masonry during installation of masonry work. Where possible, anchor to form work before concrete placement.
- C. Provide permanent grounds of dressed, preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material involved. Remove temporary grounds when no longer required.

3.05 INSTALLATION OF ENGINEERED WOOD PRODUCTS

- A. Erect and brace members to comply with recommendations of manufacturer.
 - 1. Erect members with webs vertical (plumb) and parallel to each other. Located accurately at design spacing indicated.
 - 2. Hoist units in place by means of proper lifting equipment suited to size and types of members required, applied at proper lift points as recommended by fabricator, exercising care not to damage members or joints by out-of-plane bending or other causes.
 - 3. Provide temporary bracing as required to maintain plumb, parallel, and in proper location, until permanent bracing is installed.
 - 4. Anchor members securely at all bearing points to comply with methods and details indicated.

END OF SECTION 06 17 00

GLUE LAMINATED CONSTRUCTION SECTION 06 18 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1;
 - 2. Furnish glue laminated wood members as shown on the drawings, as specified herein, and as necessary to complete work;
 - 3. Submittal preparation;
 - 4. Clean up.
- B. Related Sections:
 - 1. Section 05 12 00: Structural Steel
 - a. Including furnishing of anchors, baseplates, and steel connections.
 - 2. Section 06 10 00: Rough Carpentry
 - a. Including installation of glue laminated members.
 - b. Including installation of anchors, baseplates, and steel connections.

1.02 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. ANSI/AITC A190.1 - Standard Specification for dimensions of Structural Glued Laminated timber.
- B. ASTM International (ASTM)
 - 1. ASTM D2559 – Standard Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions.
 - 2. ASTM D3737 – Standard Practice for Establishing Allowable Properties for Structural Glued Laminated Timber (Glulam).

1.03 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 “Administrative requirements” for submittal procedures.
- B. Product Data: Manufacturer’s data sheets on each product to be used including:
 - 1. Technical data including compliance with specifications and standards.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Certification: Submit certification that the decking size specified will meet the specified design wind pressure and show loads.

D. Selection Samples: For each finish product specified, four (4) complete sets of finish samples of the manufacturer's standard stain colors on the specified species and with the specified pattern, size, texture, and finish.

E. Substitutions:

1. Substitute materials must be substantially similar in size and detail to the referenced products to maintain structural integrity of connections and to maintain design clearances for adjacent work.
 - a. Substitute materials must have documented equivalency in moment resistance, shear strength, and stiffness.
 - b. Substitutions must be submitted as a no cost Change Order and must be submitted and approved by the Structural Engineer of Record.

1.04 QUALITY ASSURANCE

A. Wood Structural Design Standard:

1. National Design Specification for Wood Construction published by National Forest Products Association.

B. Grading of Lumber:

1. Provide lumber graded by a recognized agency, with rules and service complying with requirements of American Lumber Standards committee and PS 20. Use only lumber pieces which bear inspection service's grade mark, unless otherwise indicated. (Remove mark during fabrication if necessary).

C. Glue Lam Fabrication Standard:

1. Standard Specifications for Structural Glue-Laminated Timber, American Institute of Timber Construction, ANSI/AITC A190.1.

D. Reference Standards:

1. Title 24, State of California Code of Regulations.

E. Inspection, Notification, and Testing:

1. All structural glue-laminated timbers shall be continuously inspected during fabrication by an inspector specifically approved by the Division of the State Architect in compliance with Title 24, Section 2303.1.3.
 - a. An AITC certificate alone will not be adequate to meet this requirement.
2. A testing lab shall spot check the moisture content of glue lam members upon delivery of the members to the jobsite. If the moisture content, as measured 2" below the surface of the member, fails to conform to the requirements of these specifications or the applicable standards, the member may be rejected.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Glue laminated members shall be fabricated of Douglas Fir in accordance with the Standard Specifications for Structural Glue-Laminated Timber, American Institute of Timber Construction, ANSI/AITC A109.1.
- B. Adhesives shall be exterior-type and shall comply with the requirements of ASTM D 2559, West Use adhesive.
- C. Moisture content at the time of fabrication shall be between seven percent (7%) and twelve percent (12%).
 - 1. Maximum difference between the wettest driest components shall be five percent (5%).
- D. Stress Values for Members:
 - 1. Use laminating combination 24F-V8 or other method that meets or exceeds the following stress values for normal load duration and dry condition of use:
 - a. Bending (Fb): 2,400 psi
 - b. Horizontal Shear (Fv): 165 psi
 - c. Compression Perpendicular to Grain (Fc-tension face): 450 psi
 - d. Compression Perpendicular to Grain (Fc-compression face): 450 psi
 - e. Modulus of Elasticity (E): 1,800,000 psi

2.02 FABRICATION

- A. End joints shall be plain scarf joints or finger joints, providing the joint used meets the end joint qualifications of ANSI/AITC A190.1, and the following:
 - 1. In the top and bottom outer 1/8 of the laminations, all portions of the end joints in adjacent laminations shall be separated by a minimum of six inches (6").
 - 2. Knots, waness, or other strength-reducing defects are not permitted within six inches (6") of any lamination joint.
 - 3. Plain scarf end joints shall have a slope not steeper than one in ten (1:10).
- B. Appearance Grade:
 - 1. Exposed interior glue-laminated beams which are exposed to view shall be Architectural Grade conforming to AITC 110.
 - 2. Non-exposed interior glue-laminated beams which are not exposed to view shall be Industrial Grade conforming to AITC 110.
- C. Camber members as shown on the drawings.
 - 1. Circular or parabolic at the manufacturer's option.

- D. The surfaces of all members shall be sealed.
1. Exposed interior glue-laminated beams which are exposed to view and receive a natural finish shall be sealed with AITC #117 penetrating sealer.
 2. Non-exposed interior glue-laminated beams which are not exposed to view shall be sealed with AITC #117 clear sealer coat.
 3. All exterior glue-lam members and all glue-lam members which are partially exterior shall be constructed of lumber which has been treated with "Cellon" pressure process.
 - a. Apply in accordance with the standards of the American Wood Preservers' Association.
 - b. Apply in accordance with the standards of Koppers Company, Inc. specification for treatment.
 - c. Use pentachlorophenol meeting the requirements of Section 1 of the AWP Standards P-8, "Standard for Oil-Borne Preservatives."
 - 1) Use penta check method Section 5 AWP Standard A-3 to determine pentachlorophenol penetration.
 - 2) Pentachlorophenol retention shall be as follows:
 - a) Type of Material: lumber used in laminating
 - b) Assay Zone: 0.5" to 1.0"
 - c) (Pcf Penta) Above Ground Exposures: 0.30
 - d) (Pcf Penta) In Ground Exposures: 0.60
 - d. Pressure treatment shall be conducted in accordance with AWP Standard C-2 (lumber, timber, etc.) or C-28 (lumber treated before laminating).
 4. Immediately after end-cutting, apply a saturation coat of end sealer to ends and other cross-cut surfaces.
 - a. Keep surfaces flood-coated for a minimum of 10 minutes.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrata and bearing conditions prior to joist installation.
1. Report any conditions which are detrimental to proper completion of this work.

3.02 DELIVERY, STORAGE AND HANDLING

- A. Handle and store members with care, and in accordance with manufacturer's instructions and recommendations to avoid damage from bending, overturning, or other cause for which member is not designed to resist or endure. Protect members from weather with factory applied protective covering until erected.
- B. Time delivery and erection of members to avoid delaying work of other trades whose work must follow erection of members.
- C. Members shall be properly wrapped for shipment and storage.

3.03 INSTALLATION

- A. All glue-laminated members shall be installed in accordance with approved shop drawings and instruction thereon.
- B. Field Inspection:
 - 1. The project's resident site inspector shall verify identifying stamp markings of delivered material.
 - 2. The project's resident site inspector shall verify moisture content of delivered material.
- C. Modifications:
 - 1. Hole cutouts shall conform to manufacturer's recommendations for location and size.
 - a. Holes shall be the minimum size required for their function.
 - b. Holes shall be cut clean and true.
 - c. Overcutting of holes will not be permitted.
 - d. No holes shall be cut without consulting with Structural Engineer.

3.04 PROTECTION OR ADJUSTMENTS

- A. Protect materials and installed work from damage until acceptance by owner.
 - 1. Repair or replace damaged work.

3.05 CONDITION OF FINISHED WORK

- A. Members shall be installed true-to-line, plumb, and in accordance with approved drawings.
 - 1. Bearing lengths shall conform to approved drawings.
 - a. Inadequate bearing length shall be cause for rejection of work.

END OF SECTION 06 18 00

**FINISH CARPENTRY
SECTION 06 20 00**

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1.
2. Finish carpentry.
3. Laying out of work.
4. Cutting and patching required by the work of other trades.
5. Rough hardware including bolts, millwork assembly bolts, nails, etc.
6. Installation of millwork, exposed interior or exterior plywood, wood stop windows, and finish trim, cement board facia members and trim.
7. Installation of toilet room accessories and fixtures.
8. Installation of doors and finish hardware.
9. Gypsum board under or behind accessories or fixtures in fire-rated assemblies.
10. Insulated building caulking.
11. Installation of hollow metal frames, including reinforcing bar and grouting.
12. Filling of exterior thresholds with mastic and sealing of metal door jams.
13. Submittal preparation.
14. Clean up.

B. Related Sections:

- | | |
|------------------------|-------------------------------|
| 1. Section 06 10 00 | Rough Carpentry |
| 2. Section 07 21 00 | Thermal Protection |
| 3. Section 08 11 13 | Hollow Metal Doors and Frames |
| 4. Section 08 14 16 | Wood Doors |
| 5. Section 08 71 00 | Door Hardware |
| 6. Section 10 12 00 | Display Cases |
| 7. Section 10 14 00 | Signage |
| 8. Section 10 21 13.13 | Metal Toilet Compartments |
| 9. Section 10 21 13.19 | Plastic Toilet Compartments |
| 10. Section 10 28 00 | Toilet Accessories |
| 11. Section 10 44 00 | Fire Protection Specialties |
| 12. Section 10 51 13 | Metal Lockers |

1.02 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data: Provide technical data on each product specified and application instructions.

- C. Samples: For rough carpentry members that will be exposed to view, submit two samples, 12" x 12" in size illustrating wood grain, color, and general appearance.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Lumber shall be surfaced, milled, or worked to patterns, as indicated on the drawings.
- B. Lumber incorporated in the work shall be dried to a maximum moisture content of 15%.
- C. Redwood shall be clear, all heart, Architectural Select.
 - 1. Use stainless steel or Monel metal nails.
- D. Interior wood trim shall be Ponderosa Pine, "C" Select or better, kiln dried.
- E. Interior Plywood shall be A-D Interior Grade, Douglas Fir Plywood, three-eighths inch (3/8") thick minimum, unless noted otherwise.
 - 1. Flame spread shall be Class III of 76-200 and smoke density shall be no greater than 450 when tested in accordance with UBC Standard 8-1 in the way intended for use. (CBC 802.1 and 802.2)
 - 2. Provide fire-treated plywood where indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify all required backing and blocking prior to enclosing framing.
- B. Verify framing or surfaces are acceptable prior to installing finish materials.
 - 1. Preparatory work is complete.
 - 2. Subsurface is plumb, straight, and true.
 - 3. Surface is securely fastened to structure.
 - 4. No blemishes or nail pops.

3.02 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store materials in accordance with the manufacturer's recommendations.
- B. Store materials in a secure dry area in their original packaging until time of installation.

3.03 SEQUENCING AND SCHEDULING

- A. Sequence work to prevent damage from subsequent trades.

3.04 INSTALLATION OR APPLICATION

- A. Hollow Metal Doors and Frames and Wood Doors:
 - 1. Install per manufacturer's recommendations and the requirements of the corresponding specification section.
- B. Wood Door Frames:
 - 1. Set plumb, level, true, and square.
 - 2. Joints to be tight.
 - 3. Block or shim behind all items to receive hardware.
 - 4. Set nails for putty.
- C. Interior Wood Trim:
 - 1. Avoid splicing of material wherever possible.
 - 2. Install trim straight, true, and level.
 - 3. Joints:
 - a. Inside corners: Butt joint or cope.
 - b. Outside corners: Miter joint.
 - c. End-to-end joints: Not permitted.
 - 4. Wood siding and skirting.
 - a. Galvanized "z" flashing at horizontal joints.
 - 5. Pitch pockets shall be cut out of exposed wood construction.
 - 6. Nail with staggered nailing where possible to prevent splitting.
 - a. Use sufficient nails to hold trim snug and true-to-line.
 - b. Set nails for putty
- D. Casework and Hardware:
 - 1. Install per manufacturer's recommendations and the requirements of the corresponding specification section.
 - a. Refer to casework specifications for California Building Code compliant hardware.
 - 2. Install doors, windows, and casework hardware so that they operate freely without sticking or binding.
 - a. Properly adjust hardware.
 - 3. Set nails for putty.
- E. Miscellaneous Equipment and Hardware:
 - 1. Install per manufacturer's recommendations and the requirements of the corresponding specification section.
 - 2. Use concealed fasteners where possible.

3.05 QUALITY CONTROL

- A. Tolerances:
 - 1. Gaps Around and Between Doors
 - a. Shall not exceed 1/8".

3.06 CLEANING OR REPAIR

- A. Keep premises clean during the progress of the work.
- B. Thoroughly clean-up work and adjacent areas upon completion of the work.
 - 1. Sweep areas clean, vacuum carpeted areas.
 - 2. Remove tools, excess material, and debris from the site.
- C. Protect this work from damage of any kind until acceptance of the building.
 - 1. All exposed interior lumber shall be protected from sun and weather.

3.07 CONDITION OF FINISHED WORK

- A. Heads and sills of the same height shall line up with each other.
- B. Wood finish shall be surfaced, cleaned, sanded, and ready for finish application.
 - 1. No sandpaper marks, hammer marks, or blemishes will be allowed.
- C. Space around doors shall be uniform on both sides and top.
- D. Trim shall be straight and true with uniform reveals around frames and openings.
- E. Glass, hardware, plumbing fixtures, light fixtures, switch plates, service outlets, and grilles shall be clean and in an acceptable condition.

END OF SECTION 06 20 00

DAMPPROOFING AND WATERPROOFING

SECTION 07 12 00

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1.
2. Below-grade wall waterproofing of concrete or concrete masonry.
3. Submittal preparation.
4. Clean up.

B. Related Sections:

- | | |
|----------------------|--------------------------|
| 1. Section 03 31 00: | Structural Concrete Work |
| 2. Section 04 22 00: | Concrete Unit Masonry |
| 3. Section 07 92 00: | Joint Sealants |
| 4. Section 31 22 00: | Earthwork |
| 5. Section 32 13 13: | Site Concrete |

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM D146 – Standard Test methods for Sampling and Testing Bitumen-Saturated Felts and Fabrics Used in Roofing and Waterproofing.
2. ASTM D412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomer- Tension.
3. ASTM D570 – Standard Test Method for Water Absorption of Plastics.
4. ASTM D903 – Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
5. ASTM D1876 – Standard Test Method for Peel Resistance of Adhesives (T-Peel Test).
6. ASTM E96 (Method B) – Standard Test Methods for Water Vapor Transmission of Materials.
7. ASTM E154 – Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements": for submittal process.**

- B. Product or Material Data:
 - 1. Submit copies of manufacturer's products specifications to Architect for review prior to starting installation.
 - 2. Submit copies of manufacturer's latest written installation or application recommendations.
- C. Close-Out Submittals:
 - 1. Furnish the Architect a certificate from the applicator certifying the work was performed in accordance with these specifications and the manufacturer's recommendations.
 - a. Indicate the number of coats and the rate of coverage of each coat.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Use an experienced installer and adequate number of skilled personnel who are thoroughly trained and experienced in the application of fluid applied waterproofing membranes.
- B. Obtain waterproofing materials from a single manufacturer regularly engaged in manufacturing the product.
- C. Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOCs).
- D. Warranty:
 - 1. Furnish a five-year guarantee covering the waterproofing and dampproofing work of the project.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Store materials in a clean dry area in accordance with manufacturer's instructions.
- C. Store adhesives and primers at temperatures of 40 degrees F and above to facilitate handling.
- D. Store membrane cartons on pallets.
- E. Do not store at temperatures above 90 degrees F (32 degrees C) for extended periods.
- F. Keep away from sparks and flames.
- G. Completely cover when stored outside. Protect from rain.

- H. Protect materials during handling and application to prevent damage or contamination.
- I. Avoid use of products which contain tars, solvents, pitches, polysulfide polymers, or PVC materials that may come into contact with waterproofing membrane system.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Product not intended for uses subject to abuse or permanent exposure to the elements.
- B. Protect rolls from direct sunlight until ready for use.
- C. Do not apply standard membrane when air or surface temperatures are below 40 degrees F (4 degrees C).
- D. Do not apply to frozen concrete.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. W. R. Meadows Co.
 - 2. Tremco Commercial Sealants and Waterproofing
 - 3. Or approved equal. See Section 01 60 00 "Product Requirements: for substitution requirements.
- B. Basis of Design:
 - 1. MEL-ROL Waterproofing System by W.R. Meadows.

2.02 MATERIALS

- A. Rolled, Self-Adhering Sheet Waterproofing Membrane: Polymeric waterproofing membrane protected by release paper on polyethylene carrier film with exposed polymeric membrane strips on both sides protected by pull-off release strips.
- B. Below-Grade Waterproofing Membrane (Non-Drained System):
 - 1. Primary membrane: 56 mil polymeric waterproofing membrane on a heavy duty 4 mil cross laminated polyethylene carrier film.
 - 2. Protective cover of 1/8" thick HDPE sheet - color black or brown.
 - 3. Use terminator bars with power driven fasteners and polyurethane mastic at top.

- C. Below-Grade Waterproofing Membrane (Drained System):
1. Primary membrane: 56 mil polymeric waterproofing membrane on a heavy duty 4 mil cross laminated polyethylene carrier film.
 2. Drainboard - AVM 6000 dimple board with heavy duty geotextile fabric or approved equal.
 3. Use terminator bars with power driven fasteners and polyurethane mastic at top of waterproofing membrane.

2.03 ACCESSORIES

- A. Surface Conditioner: MEL-PRIME
- B. Flashing and Fillets: MEL-ROL LIQUID MEMBRANE
- C. Termination Selant: POINTING MASTIC
- D. Termination Bar: TERMINATION BAR
- E. Corner and Detailing Tape: DETAIL STRIP
- F. Waterproofing Protection Course: PC-2 PROTECTION COURSE
1. 15 mil thick
- G. Rolled Matrix Drainage System: MEL-DRAIN Rolled Matrix Drainage System.

PART 3 EXECUTION

3.01 EXAMINATION

4. Examine surfaces to receive self-adhering membrane. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected. Commencement of the Work shall construe Contractor acceptance of conditions.
5. Apply self-adhering sheet waterproofing to cured concrete surfaces a minimum of three (3) days after removal of forms.

3.02 SURFACE PREPARATION

- A. Protect adjacent surfaces not designated to receive waterproofing.
- B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.
- C. Do not apply waterproofing to surfaces unacceptable to manufacturer.
- D. Concrete surfaces must be clean, smooth and free of standing water.

- E. Patch all holes and voids and smooth out any surface misalignments.
- F. Apply only enough adhesive to surfaces that will be covered with self-adhering membrane within one working day. Apply adhesive in accordance with manufacturer's recommended coverage rates.
- G. Apply fillet beads of termination sealant at inside corners. Upon curing of sealant, install corner tape on all inside and outside corners, including footings. Ensure a minimum of 3" inches coverage of membrane onto each adjacent plane.
- H. Joint Reinforcement:
 - 1. For static cracks and cold joints a minimum of 1/16" but not greater than 1/8", apply detailing membrane 9" wide strip of self-adhering detail tape centered over the joint.
 - 2. For expansion joints up to 1", apply a backer rod larger than joint width into the gap and cover with self-adhering detailed tape. Ensure not less than 3" of membrane are applied substrates on both sides of the gap.
- I. Pipe Penetrations:
 - 1. Finger flash pipe penetrations with a minimum 6" wide detailing tape by applying 3" fingers onto surrounding substrate and 3" of tape onto pipe circumference, with 2" minimum overlap. Seal all edges of flashing with termination sealant. Seal all terminations with termination sealant.
- J. Seal all terminations and exposed membrane edges with termination sealant.

3.03 APPLICATION

- A. Primary Membrane Application:
 - 1. Apply waterproofing membrane system in accordance with manufacturer's instructions.
 - 2. Remove release backing paper, then position the membrane at the lowest point. Ensure the proper overlap is maintained for all side and end laps.
 - 3. Pull balance of release paper off, then press into place to ensure full contact and elimination of all wrinkles.
 - 4. Stagger end laps and overlap all seams at least 2-1/2".
 - 5. Terminate the top leading edge of membrane with termination bar and termination sealant as required.
 - 6. Seal all terminations and non-factory edges with termination sealant.
 - 7. Inspect membrane before covering and repair as necessary. Cover tears and inadequate overlaps with membrane, extending 6" affected areas. Seal all sides of patches and repair areas with termination sealant.
 - 8. Use only equipment specifically recommended or approved by the manufacturer.

- B. Non-Drained system: HDPE shall be fully adhered to waterproofing membrane peel and stick membrane. Immediately apply HDPE to membrane to avoid surface contamination from dust and dirt.
- C. Drained System: Apply drainboard against waterproof membrane with stainless steel shot pins and plastic washers per manufacturer's requirements.
 - 1. Install 12" of course gravel around drainage pipe with a layer of geotextile fabric over gavel.
 - 2. Foundation drainpipe shall be connected into the storm drain system and shall slope at 1% minimum.
- D. Backfill with sand for a minimum thickness of 6" from the membrane.
- E. Compact remainder of backfill as required per Section 31 22 00 "Earthwork".

3.04 CONDITION OF FINISHED WORK

- A. Uniformly applied coatings with straight true-to-line terminations of products and are free of fins, ridges, or voids.
- B. Troweled applications shall be of uniform finish free of fins, ridges, and voids.
- C. Caulking in secondary expansion joints, or construction joints is in good condition and free of voids.

3.05 PROTECTION

- A. Protect membrane immediately after application with application of rigid insulation or drainage panel or asphaltic sheet.
- B. Backfill immediately using care to avoid damaging waterproofing membrane system.

END OF SECTION 07 12 00

THERMAL INSULATION SECTION 07 21 00

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1.
2. Above-ground thermal insulation shown on drawings, and as required to form a complete insulation envelope.
3. Above-ground sound insulation shown on drawings.
4. Floor insulation under slab where shown.
5. Caulking.
6. Submittal preparation.
7. Clean up.

B. Related Sections:

1. Section 06 10 00 Rough Carpentry

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM C578 – Standard Specification for Rigid, Cellular Polystyrene thermal Insulation.
2. ASTM C665 – Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame construction and Manufactured Housing.
3. ASTM C764 – Standard Specification for Mineral Fiber Loose-Fill Thermal Insulation.
4. ASTM E84 – Standard Test method for Surface Burning Characteristics.
5. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750° C.

B. National Fire Protection Association (NFPA)

1. NFPA 259 – Standard Test Method for Potential heat of Building materials.
2. NFPA 285 – Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components.
3. NFPA 286 - Standard Fire Test Method for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product Data: Submit insulation manufacturer's product data, building code compliance reports or test reports and the insulation manufacturer's printed installation guidelines.
 - 1. Submit data for each type of insulation specified.
 - 2. Submit data for sustainable design:
 - a. Recycled content.
 - b. Adhesives indicating VOC content.
 - c. Lab test reports indicating requirements for low-emitting materials.
 - 3. Submit data for certification of listing type, manufacturer, and R-value of insulation in each application of the building thermal envelope.

1.04 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Insulation shall comply with California Quality Standards for Insulating Materials.
- B. Qualifications:
 - 1. Manufacturers: Company specializing in manufacturing products specified in this section with not less than five years documented experience.
 - 2. Installers: Company specializing in installation manufactured products in this section with not less than five years documented experience.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Certainteed.
- B. Johns Manville.
- C. Owens Corning.
- D. Or approved equal.

2.02 MATERIALS

A. General:

1. Insulation shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers".
 - a. Use formaldehyde shall not be permitted.
2. Recycled Content: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 10 percent.

B. Thermal Insulation Above Grade (concealed):

1. Glass-Fiber Blanket Insulation, Unfaced: ASTM C665, Type I: passing ASTM E136 for combustion characteristics:
 - a. Flame spread rating of less than 25 when tested in accordance with ASTM E84.
 - b. Smoke density of less than 50 when tested in accordance with ASTM E84.
 - c. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12" and wider in width.
 - d. Rating requirements may be reduced when allowed by specific exception per the CBC.

C. Thermal Insulation Above Grade (exposed):

1. Glass-Fiber Blanket Insulation, Kraft Faced: ASTM C665, Type II (non-reflective faced, Class C (faced surface not rated for flame propagation): Category 1 (membrane is a vapor barrier):
 - a. Flame spread rating of less than 25 when tested in accordance with ASTM E84.
 - b. Smoke density of less than 50 when tested in accordance with ASTM E84.
 - c. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12" and wider in width.
 - d. Rating requirements may be reduced when allowed by specific exception per the CBC.

D. Thermal Insulation Above Grade (part of a fire-rated assembly):

1. Glass-Fiber Blanket Insulation, Foil Faced: ASTM C665, Type III (reflective faced, Class B (faced surface with flame propagation): Category 1 (membrane is a vapor barrier), faced with foil scrim, foil scrim kraft, or foil-scrim polyethylene:
 - a. Flame spread rating of less than 25 when tested in accordance with ASTM E84.
 - b. Smoke density of less than 50 when tested in accordance with ASTM E84.
 - c. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12" and wider in width.
 - d. Rating requirements may be reduced when allowed by specific exception per the CBC.

E. Roof Deck Insulation:

1. Extruded Polystyrene Board Insulation with cover board: Type X; ASTM C578, Type X, 15- psi minimum compressive strength unfaced.
 - a. Flame spread rating of less than 25 when tested in accordance with ASTM E84.
 - b. Smoke density of less than 450.
 - c. Per CBC standard #8-1.
 - d. Or approved equal.
 - 1) Molded bead type or polyisocyanurate will not be accepted.

F. Exterior Wall Insulation:

1. Reinforced foil faced fiberglass batt insulation, unless noted or scheduled otherwise.
 - a. R=21 FSK-25, unless noted otherwise.
 - b. Where allowed by code, Kraft paper faced batt insulation may be used only when wall cell is completely enclosed by framing and finishes.
 - 1) No space shall exist between the paper face and the wall finish.

G. Roof/Ceiling Insulation:

1. Reinforced foil-faced fiberglass batt insulation, unless noted or scheduled otherwise.
 - a. Batt insulation shall be of width required to be one piece between ceiling or roof joists.
 - b. R=30, 11" thick, FSK-25, unless noted otherwise.
 - c. Where allowed by code, Kraft paper-faced batt insulation may be used in attics when installed in non-rated assemblies where insulation is on the ceiling. The Kraft paper side shall be installed tight to the ceiling gypsum board.
 - 1) No space shall exist between the paper face and the finish.

H. Sound Insulation:

1. Interior wall sound insulation.
 - a. Glass-fiber insulation as shown on the Drawings, around all offices, classrooms, restrooms, and restroom ceilings.
 - b. R=19, 5 1/2" thick unless noted otherwise.

I. Fasteners

1. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.
 1. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AGM Industries, Inc.
 - b. Midwest Fasteners, Inc.
 - c. Or approved equal.

2. Plate: Perforated, galvanized carbon-steel sheet, 0.030" thick by 2" square.
3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.150" in diameter length to suit depth of insulation.
4. Insulation-Retaining Washers: Self-locking washers formed from 0.016" thick galvanized -steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2" square or diameter.
5. Anchor Adhesive: Product with demonstrated capacity to bond insulation anchors securely to substrates without damaging insulation, fasteners or substrates.

J. Accessories

1. Insulation for Miscellaneous Voids:
 - a. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.
2. Adhesives for Bonding Insulation:
 - a. Provide compatible insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.
 - 1) Adhesives shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers".
 - a) Use formaldehyde shall not be permitted.
 - 2) Adhesives shall have a VOC content of 70 g/L or less.
3. Asphalt Coating for Cellular -Glass Block Insulation: Cutback asphalt or asphalt emulsion of type recommended by manufacturer of cellular-glass block insulation.
4. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Contractor shall examine conditions under which insulation work is to be performed.
 1. Do not install materials where unsatisfactory support conditions exist.
 2. Notify Architect of such unsatisfactory conditions.

3.02 PREPARATION

- A. Clean substrata prior to installation of materials.
- B. Remove or repair conditions that may puncture vapor barrier.

3.03 INSTALLATION

- A. Comply with the manufacturer's latest written recommendations.
 - 1. Consult manufacturer's technical representative for conditions not covered in written recommendations.
- B. Insulation shall form a complete thermal envelope around all interior spaces.
 - 1. Typical areas to be insulated:
 - a. Exterior walls.
 - b. Attics:
 - c. Interior partitions and ceilings where shown.
 - d. Restroom walls and ceilings (above framed ceilings only).
 - e. Furring at acoustic panels.
 - f. Below cold storage room finish slabs.
 - g. Areas shown to receive insulation on the drawings.
 - 2. Small Areas:
 - a. Fill small voids with insulation to provide a complete thermal envelope.
 - b. Fill hollow metal frames with insulation to provide a complete thermal envelope.
 - 3. Piping, Conduits, or Boxes in Walls:
 - a. Fit insulation around obstruction.
 - b. Place between obstruction and exterior wherever possible.
 - 4. Insulation shall be a single layer of the shown or specified thickness, unless noted otherwise.
 - 5. Insulation shall be installed without compressing the material.
 - a. Fluff out insulation so that the facing will be tight against the wall sheathing.
 - b. Prevent voids that will create convection currents within the wall.
- C. Sound Insulation shall form a complete sound wall between rooms indicated.
 - 1. Typical areas to be insulated:
 - a. Full height of interior structural walls where shown.
 - b. Full height of interior partitions ceilings where shown.
 - 2. Small Areas:
 - a. Fill small voids with insulation to provide a complete sound envelope.
 - b. Fill hollow metal frames with insulation to provide a complete sound envelope.
 - 3. Piping, Conduits, or Boxes in Walls:
 - a. Fit insulation around obstruction.
- D. Vapor Barriers:
 - 1. Place vapor barriers on the inside of the insulation envelope, unless shown otherwise.
 - 2. Batt insulation shall be installed tight to the underside of roof deck or wall finish material, unless noted otherwise.
 - 3. Facing flanges shall be stapled to adjacent framing wherever possible.

3.04 PROTECTION

- A. Protect insulating materials from exposure to moisture or to physical damage.
- B. Protect adjacent finishes and the work of other trades.

3.05 CLEANING AND REPAIR

- A. Keep premises clean during the progress of the work.
- B. Thoroughly clean-up work and adjacent areas upon completion of the work.
 - 1. Sweep areas clean.
- C. Repair damage that may have occurred to insulating materials.
 - 1. Tape any tears in facing material with materials of equal flame spread characteristics.
- D. Repair damage to adjacent materials or the work of other trades as a result of the work of this Section.

END OF SECTION 07 21 00

UNDER-SLAB VAPOR BARRIER
SECTION 07 26 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Vapor barrier and installation accessories for installation under concrete slabs.
 - 2. Submittal Preparation.
 - 3. Clean-up.
- B. Related sections:
 - 1. Section 03 31 00 Structural Concrete Work

1.02 REFERENCES

- A. ASTM International:
 - 1. ASTM E1643-18a: Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 - 2. ASTM E1745-17: Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
- B. American Concrete Institute (ACI):
 - 1. ACI 302.1R-15: Guide to Concrete Floor and Slab Construction.
 - 2. ACI 302.2R-06: Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirement" for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instruction and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.

1.04 QUALITY ASSURANCE

- A. Certifications:
 - 1. Submit material certification for admixtures and aggregates, certifying their compliance with specifications.
 - 2. Submit certified mill test reports for lot of cement.
 - 3. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1
- B. Contact vapor barrier manufacturer to schedule a pre-construction meeting and to coordinate a review, in-person or digital, of the vapor barrier installation.

- C. Vapor barrier manufacturers must warrant in writing (a) compliance with the designated ASTM E1745 classification, and (b) no manufacturing defects in the product for at least ten (10) years.
- D. Manufacturers verify in writing 20 years in the industry with no reported product failures.

1.05 PRE-INSTALLATION CONFERENCE

- A. Conduct pre-installation conference in accordance with Section 01 30 00 "Administrative Requirements".
 - 1. Contact membrane vapor barrier manufacturer to participate in pre-installation conference and coordinate a review, in-person or digital, of the vapor barrier installation prior to concrete placement.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General:
 - 1. Basis of Design: Stego Wrap Vapor Barrier by Stego Industries LLC., (877) 464-7834 www.stegoindustries.com.
- B. Manufacturers/Vapor barrier products:
 - 1. Stego Industries LLC., Stego Wrap Vapor Barrier
 - 2. W.R. Meadows, Perminator
 - 3. Fortifiber, Moistop Ultra
 - 4. Or approved equal.
- C. Vapor barrier shall have the following minimum requirements:
 - 1. Maximum Permeance: Maintain permeance of less than 0.01 Perms grains/(ft² · hr · inHg) as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
 - 2. Water Vapor Barrier: ASTM E1745, Class A.
 - 3. Thickness: 15 mils minimum (ACI 302.1R-15)
 - 4. All testing shall be performed on a single production roll per ASTM E1745 Section 8.1.

2.02 ACCESSORIES

- A. All accessories used must be from the same manufacturer of the vapor barrier material to ensure a cohesive, compatible system.
 - 1. Seams:
 - a. Stego Tape by Stego Industries
 - b. Or approved equal.
 - 2. Sealing Penetrations of Vapor barrier:
 - a. Stego Mastic by Stego Industries
 - b. Stego Tape by Stego Industries
 - c. Or approved equal.

3. Perimeter/terminated edge seal:
 - a. Stego Crete Claw (textured tape) by Stego Industries
 - b. Stego Term Bar by Stego Industries
 - c. Stego Tack Tape (double-sided sealant tape) by Stego Industries
 - d. One-sided seaming tape is not a recommended method of sealing at the terminated edge.
 - e. Or approved equal.
4. Penetration Prevention:
 - a. Beast Foot by Stego Industries
 - b. Or approved equal.

PART 3 EXECUTION

3.01 PREPARATION

- A. Under-slab Vapor Barrier
 1. Ensure that subsoil is approved by Architect or Geotechnical Engineer.
 2. Level and compact base material.
 3. Install vapor barrier in accordance with ASTM E1643.
- B. Contact vapor barrier manufacturer to schedule a pre-construction meeting and to coordinate a review, in-person or digital, of the vapor barrier installation.

3.02 INSTALLATION

- A. Install vapor barrier in accordance with ASTM E1643.
 1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
 2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, water stops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.
 - a. Seal vapor barrier to the entire slab perimeter using manufacturer's textured tape with a surface that creates a mechanical seal to freshly placed concrete, per manufacturer's instructions. OR
 - b. Seal vapor barrier to the entire perimeter wall or footing/grade beam with manufacturer's double-sided tape, or both termination bar and double-sided tape, per manufacturer's instructions. Ensure the concrete is clean and dry prior to adhering tape.
 3. Overlap joints 6 inches and seal with manufacturer's seam tape.
 4. Apply seam tape/textured tape/double-sided tape to a clean and dry vapor barrier.
 5. Seal all penetrations (including pipes) per manufacturer's instructions.
 6. Avoid the use of stakes driven through vapor barrier by utilizing screed and forming systems that will not puncture the vapor barrier.
 7. Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.

8. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.
9. Utilize vapor barrier sealing accessories from the same manufacturer as the vapor barrier membrane.

END OF SECTION 07 26 00

SHEET METAL FLASHING AND TRIM SECTION 07 62 00

PART 1 GENERAL

1.01 SUMMARAY

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1.
2. Sheet metal work:
 - a. Gutters, downspouts, splash pans, drip flashing, wall caps, metal edging, flashing, diverters, scuppers, etc.
 - b. Counter-flashing, patent flashing.
 - c. Louvers, screens, grilles, etc.
 - d. Expansion joints not included in other sections.
 - e. Clips and fasteners for sheet metal work and trim.
 - f. Sheet metal reveals or accents.
3. Reglet and flashing system.
4. Aluminum work not included in other sections.
5. Stainless steel work not included in other sections.
6. Submittal preparation.
7. Clean up.

B. Related Sections:

- | | |
|---------------------|--|
| 1. Section 07 41 13 | Metal Roof Panels |
| 2. Section 07 42 13 | Metal Wall Panels |
| 3. Section 07 54 19 | Polyvinyl-Chloride (PVC) Roofing |
| 4. Section 07 72 00 | Roof Accessories |
| 5. Section 23 00 00 | Heating Ventilating & Air-Conditioning |

1.02 PERFORMANCE REQUIREMENTS

A. Flashing Systems:

1. Completed work shall, in conjunction with roofing, doors, windows, equipment, and building finish materials, form a complete barrier against water.

1.03 SUBMITTALS

A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.

B. Product Data:

1. Submit copies of product data and installation recommendations of standard commercial items proposed for use on this project.

C. Shop Drawings or Layout Drawings:

1. Submit copies of shop drawings to the Architect for review prior to beginning fabrication.
 - a. Show details, joint configurations, anchorage, and materials used.
 - b. Flashing Systems:
 - a. Completed work shall, in conjunction with roofing, doors, windows, equipment, and building finish materials, form a complete barrier against water.

1.04 QUALITY ASSURANCE

A. Regulatory Compliance:

1. Comply with latest published recommendations found in the Architectural Sheet Metal Manual published by the Sheet Metal and Air Conditioning Contractor's National Association.
2. Comply with manufacturer's recommendations.

B. Roofing Pre-Application Meeting:

1. A representative of the contractor shall attend to coordinate the application of roof-related items.

PART 2 PRODUCTS

2.01 MATERIALS

A. Galvanized Sheet Steel:

1. Use 24-gauge minimum thickness material, unless otherwise noted.
2. Material shall be copper bearing with heavy galvanized finish.
 - a. Hot dip galvanized.
 - b. Minimum coating weight of 1.25 oz./sf.
 - c. Conform to ASTM A-525.

B. Reglet and Flashing System:

1. Two-part reglet and flashing system consisting of reusable counter flashing that snaps into reglet.
 - a. Quality Standard: Springlok flashing system with type STX reglet by Fry Reglet Corp.

C. Exposed Formed Flashings, Gutters, and Parapet Caps:

1. 24 ga. Galvalume 55% Al-Zn) with factory applied Kynar 500 fluoropolymer coating.
2. Color selected by Architect.

- D. Sheet Aluminum:
 - 1. Use 0.040-gauge minimum thickness material, unless otherwise noted.
 - 2. Material shall be Alcoa aluminum, 35 alloy alumilite satin finish, unless noted otherwise.
- E. Stainless Steel:
 - 1. U.S. Steel 18-8 No. 302, with #4 finish.
- F. Solder shall comply with ASTM B-32.
 - 1. Flux shall be raw muriatic acid.
- G. Louvers shall be made of galvanized formed steel.
 - 1. Construct of the following minimum size materials:
 - a. Blades: 20 gauge minimum.
 - b. Frame: 18 gauge minimum.
 - 2. Include bird/insect screens.
 - a. Ruskin #L811 or equal.
 - 3. Louvers shall have factory color finish.
 - a. Color selected by Architect.

2.02 ATTACHMENTS

- A. Wall Cap System:
 - 1. Wall cap flashing shall lock to hold down cleats per manufactured wall cap system. Hold down cleats and splice plates shall be as required by the manufacturer of wall cap system.
- B. Nails:
 - 1. Nails shall be galvanized.
- C. Rivets:
 - 1. Soft annealed non-corrosive type with rust-resistant coating.
- D. Screws:
 - 1. Screws and washers shall be cadmium plated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify all required backing and blocking prior to enclosing framing.

- B. Verify framing or surfaces are acceptable prior to installing finish materials.
 - 1. Preparatory work is complete.
 - 2. Subsurface is plumb, straight, and true.
 - 3. Surface is securely fastened to structure.
 - 4. Field verify dimensions.
 - 5. Solder joints in shop-controlled conditions where possible.

3.02 PREPARATION

- A. Fabrication:
 - 1. Provide adequate laps to allow for material expansion and contraction.
 - 2. Exposed edges shall be turned back and hemmed 1/2".
 - 3. Solder joints shall be thoroughly cleaned with acetone to a decreased, cleaned condition prior.
- B. Coordinate work with the schedules of other trades affected by this work.

3.03 INSTALLATION OR APPLICATION

- A. Sheet metal work in connection with roofs shall be set in a solid bed of approved sealant material.
- B. Fasteners:
 - 1. Wherever possible, use concealed clips or cleats in lieu of exposed fasteners.
 - 2. Fastener spacing shall not exceed 8", unless noted otherwise.
- C. Accurately form materials to fit together neatly and accurately to form an effective watertight seal.
 - 1. Materials shall fit together to form true, straight lines and angles.
- D. Counter flash corner joints and set in sealant as required to form watertight seams.
- E. Soldering:
 - 1. Pre-trim edges of sheet metal prior to soldering.
 - 2. Apply flux immediately prior to soldering to each surface.
 - 3. Apply soldering iron to material until thoroughly heated and the solder has been completely sweated through the full width of the seam.
 - 4. After soldering, all residual flux shall be removed with a solution of washing soda in water.
 - 5. In areas where water can accumulate, such as gutters, scuppers, and diverters, joints shall be soldered.

F. Reglet and Flashing System:

1. General:

- a. Coordinate counter flashing at roof surfaces with roofing work to provide weathertight condition at roof terminations.
 - b. Isolate dissimilar materials to prevent electrolysis. Separate using bituminous coating.
 - c. Secure reglets and counter flashing using continuous cleats, clips, and fasteners, in accordance with product data, and as indicated on the Drawings.
2. Install reglets in accordance with manufacturer's product data, level, and true-to-line. Verify that through-wall counter flashing occurs at or above reglet locations.
- a. Install reglets as walls are built.
 - b. Install with top of reglet a minimum of seven (7) inches above the high point of cant strip (adjacent roof).
 - c. Install reglets with one (1) inch factory-formed end lap and counter flashing with three (3) inch end lap.
3. Provide factory-fabricated corners at changes in direction.
4. Following installation of roofing, install counter flashing by snapping into reglet in accordance with manufacturer's product data. Overlap adjacent lengths six (6) inches, minimum, to allow for expansion and contraction.
5. Provide counterflashed expansion joints at 20'-0" on center.
6. Parapet caps, gutters, and other flashings exposed to normal view shall have factory applied color finish, over 24 ga galvalume.
- a. Kynar 500 fluorocarbon paint system.
 - b. Color selected by Architect.

3.04 QUALITY CONTROL

A. Field Testing:

1. Running or standing water testing may be required of the work of this Section to demonstrate water tightness of work.

B. Use full lengths of material to minimize the number of joints.

C. Sheet metal and accessories shall be left free of dirt, grease, acids, or other compounds which may inhibit the proper bonding of paint finishes.

END OF SECTION 07 62 00

ROOF ACCESSORIES SECTION 07 72 00

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1.
2. Vent, electrical, and plumbing roof jacks.
3. Associated accessories and hardware.
4. Submittal Preparation.
5. Clean up.

B. Related Sections:

- | | |
|---------------------|----------------------------------|
| 1. Section 06 10 00 | Rough Carpentry |
| 2. Section 07 41 13 | Metal Roof Panels |
| 3. Section 07 54 19 | Polyvinyl-Chloride (PVC) Roofing |
| 4. Section 07 62 00 | Sheet Metal Flashing and Trim |

1.02 REFERENCES

- A. SMACNA - Architectural Sheet Metal Manual.
- B. NRCA - National Roofing Contractors Association

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product or Material Data:
1. Submit copies of manufacturer's product specifications, installation instructions, and product recommendations.
- C. Samples or Mockups:
1. At the request of the Architect, submit one (1) sample of proposed products for approval.
 - a. If approved, the sample may be incorporated into the work.
 - b. If not approved, the sample will be returned to Contractor.

1.04 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Unless otherwise noted, comply with the SMACNA Architectural Sheet Metal Manual.
 - 2. Roof hatches shall meet CAL-OSHA requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Roof hatches and safety accessories:
 - a. Best Access Doors
 - b. Or approved equal.
 - 2. Roof Vents:
 - a. Famco
 - b. Or approved equal.
 - 3. Prefabricated Roof Jacks:
 - a. Orbit Industries, Inc.
 - b. Or approved equal.

2.02 MATERIALS

- A. Roof Hatches:
 - 1. Roof hatches shall be single leaf, with 14-gauge galvanized iron-welded construction integral-curb, double wall type, with 14 outer/22 inner gauge insulated hatch door, unless noted otherwise.
 - a. Unit to have hold-open feature.
 - b. Unit shall have integral throat venting where noted on the drawings.
 - c. Used in unconditioned Custodial areas with mop sinks.
 - d. Unit to have inside padlock provision.
 - e. Unit shall be shop-primed, ready for painting.
 - 2. Products:
 - a. Best Access Doors; E 30"x30" -RAH-W with System
 - b. Or approved equal.

- B. Roof Hatch Safety Railings:
 - 1. Roof hatch railing system satisfies requirements of OSHA 29 CFR 1910.23.
 - a. Self-closing and latching gate.
 - b. Non-penetrating attachment attaches directly to the roof flashing cap flashing.
 - c. High visibility safety yellow color.
 - d. Corrosion resistant construction.
 - 2. Products:
 - a. BA-RGRH Safety Rail & Gate for 30"x30" roof hatch.
 - b. Or approved equal.
- C. Roof Vents:
 - 1. Mount on 18-gauge galvanized iron sheet metal curb or 6063-T5 aluminum.
 - a. Unit to be complete with bird screen.
 - b. Unit shall be shop-primed, ready for painting.
- D. Roof Jacks:
 - 1. Roof jacks shall be 24 ga. galvanized sheet metal.
 - a. Orbit Industries, Inc. Series RJ, sized as required.
 - b. Or approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify all required curbs, backing, and blocking prior to enclosing framing.
- B. Start of work shall be considered as acceptance of existing conditions.

3.02 INSTALLATION OR APPLICATION

- A. Install per the manufacturer's latest written recommendations.
- B. Roof jacks shall be installed in watershed fashion with the roof covering set in a complete bed of roof mastic. The top of roof jack shall be sealed to the pipe or conduit with a double layer of aluminum tape. Clean and degrease areas required for proper tape adhesion. All roof jacks exposed to view shall be painted per Section 09 91 13 "Exterior Painting".

3.03 CONDITION OF FINISHED WORK

- A. The completed installation shall be clean, neatly finished, with no visible imperfections.
- B. All work shall be watertight soldered connections.

END OF SECTION 07 72 00

FIRESTOPPING SECTION 07 81 43

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1.
2. Firestopping:
 - a. Only tested firestop systems shall be used in specific locations as follows:
 - 1) Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways, and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
 - 2) Gaps between the top of walls and ceilings or roof assemblies.
 - 3) Openings and penetrations in fire-rated partitions or walls containing fire doors.
 - 4) Openings around structural members that penetrate floors or walls.
3. Preparation of submittals.
4. Clean up.

B. Related Sections:

- | | |
|----------------------|--|
| 1. Section 03 31 00: | Structural Concrete Work |
| 2. Section 07 92 00: | Joint Sealants |
| 3. Section 09 21 16: | Gypsum Board Assemblies |
| 4. Section 22 80 00: | Plumbing |
| 5. Section 23 00 00: | General Mechanical Requirements |
| 6. Section 26 05 00: | Basic Electrical Materials and Methods |
| 7. Section 26 72 00: | Fire Alarm System |

1.02 REFERENCES

- A. Test Requirements: ASTM E-814-02, "Standard Method of Fire Tests of Through Penetration Fire Stops".
- B. ASTM International (ASTM)
1. ASTM E-84-01, Standard Test Method for Surface-Burning Characteristics of Building Materials.
- C. California Building Code (CBC)
- D. National Fire Protection Association
1. NFPA 101 - Life Safety Code
 2. NFPA 70 - National Electric Code

E. Underwriter's Laboratories (UL)

1. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
 - a. UL Fire-Resistance Directory:
 - 1) Firestop Devices (XHJI)
 - 2) Fire Resistance Ratings (BXUV)
 - 3) Through-Penetration Firestop Systems (XHEZ)
 - 4) Fill, Voids, or Cavity Material (XHHW)
 - 5) Forming Materials (XHKU)
 - b. Test Requirements: UL 2079, "Tests for Fire Resistance of Building Joint Systems" (July 1998.)
 - c. Test Requirements: ASTM E 1966-01, "Standard Test Method for Fire-Resistive Joint Systems".

1.03 SUBMITTALS

A. Submit Product Data:

1. Manufacturer's specifications and technical data for each material, including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with the requirements of the Project.
2. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineering judgment must include both project name and contractor's name that will install firestop system as described in drawing.
3. Submit material safety data sheets provided with product delivered to jobsite.

1.04 QUALITY ASSURANCE

- A. A manufacturer's direct representative (not distributor or agent) to be onsite during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.
- B. Firestop System installation must meet requirements of ASTM E-814, UL 1479, or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
- D. Firestop Systems do not reestablish the structural integrity of load-bearing partitions/assemblies or support live loads and traffic. Installer shall consult the Structural Engineer prior to penetrating any load-bearing assembly.

- E. For those firestop applications that exist for which no UL-tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs, or other tests, will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council (September 7, 1994, as may be amended from time to time).

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A supplier's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

1.06 PROJECT CONDITIONS

- A. Do not use materials that contain flammable solvents.
- B. Schedule installation of firestopping after completion of penetrating item installation, but prior to covering or concealing of openings.
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- D. Weather Conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at jobsite.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.
- D. Comply with recommended procedures, precautions, or remedies described in material safety data sheets as applicable.

- E. Do not use damaged or expired materials.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer, based on testing and field experience.
- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Firestopping Materials are either "cast-in-place" (integral with concrete placement) or "post installed." Provide cast-in-place firestop devices prior to concrete placement.

2.02 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with through-penetration firestop systems (XHEZ) and joint systems (XHBN) listed in Volume 2 of the UL Fire Resistance Directory; provide products of the following manufacturers as identified below:
 - 1. Hilti, Inc.:
 - a. Hilti products listed as design standard.
 - b. Or approved equal.

2.03 MATERIALS

- A. Use only firestop products that have been UL 1479, ASTM E 814, or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- B. Sealants, caulking materials, or foams for use with non-combustible items, including steel pipe, copper pipe, rigid steel conduit, and electrical metallic tubing (EMT), the following products are acceptable:
 - 1. Hilti CP 604 Self-leveling Firestop Sealant
 - 2. Hilti CP 620 Fire Foam
 - 3. Hilti CP 606 Flexible Firestop Sealant
 - 4. Hilti CP 601s Elastomeric Firestop Sealant
- C. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:

1. Hilti CP 601s Elastomeric Firestop Sealant
 2. Hilti CP 606 Flexible Firestop Sealant
- D. Sealants, caulking, or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:
1. Hilti CP 672 Speed Spray
 2. Hilti CP 601s Elastomeric Firestop Sealant
 3. Hilti CP 606 Flexible Firestop Sealant
 4. Hilti CP 604 Self-leveling Firestop Sealant
- E. Foams, intumescent sealants, caulking, or putty materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti CP 618 Firestop Putty Stick
 2. Hilti CP 620 Fire Foam
 3. Hilti CP 601s Elastomeric Firestop Sealant
 4. Hilti CP 606 Flexible Firestop Sealant
- F. Wall opening protective materials for use with UL-listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
1. Hilti CP 617 Firestop Putty Pad
- G. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
1. Hilti CP 642 Firestop Collar
 2. Hilti CP 643 Firestop Collar
 3. Hilti CP 645 Wrap Strips
- H. Materials used for complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. Hilti CP 637 Trawlable Firestop Compound
 2. Hilti FS 657 FIRE BLOCK
 3. Hilti CP 620 Fire Foam
- I. Non-curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. Hilti FS 657 FIRE BLOCK
- J. Sealants or caulking materials used for openings between structurally separate sections of wall; the following products are acceptable:
1. Hilti CP 672 Speed Spray
 2. Hilti CP 601s Elastomeric Firestop Sealant
 3. Hilti CP 606 Flexible Firestop Sealant
 4. Hilti CP 604 Self-Leveling Firestop Sealant

- K. Provide a firestop system with an "F" Rating as determined by UL 1479 or ASTM E814 that is equal to the time rating of construction being penetrated.
- L. Provide a firestop system with an Assembly Rating as determined by UL 2079 that is equal to the time rating of construction being penetrated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Verify penetrations are properly sized and in suitable condition for application of materials.
 - 2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
 - 3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
 - 4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during, and after installation of firestopping.
 - 5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 COORDINATION

- A. Coordinate location and proper selection of cast-in-place firestop devices with trade responsible for the work. Ensure device is installed before placement of concrete.
- B. Responsible trades to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interference.

3.03 INSTALLATION

- A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory or Omega Point Laboratories Directory.
- B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.
 - 1. Seal all holes or voids made by penetrations to ensure an air and water-resistant seal.
 - 2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
 - 3. Protect materials from damage on surfaces subjected to traffic.

3.04 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or another recognized standard.
- D. Perform under this Section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.05 ADJUSTING AND CLEANING

- A. Remove equipment, materials, and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

END OF SECTION 07 84 00

JOINT SEALANTS

SECTION 07 92 00

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1.
2. Building-related joint sealants.
3. Joint primer and filler.
4. Interior joint sealant required to prevent passage of moisture into wall assemblies or behind fixtures and built-in furnishings.
5. Surface preparation.
6. Application and curing.
7. Submittal preparation.
8. Clean up.

B. Related Sections:

- | | |
|----------------------|--|
| 1. Section 03 31 00 | Structural Concrete Work |
| 2. Section 04 22 00 | Reinforced Concrete Unit Masonry |
| 3. Section 05 12 00 | Structural Steel Framing |
| 4. Section 06 20 00 | Finish Carpentry |
| 5. Section 06 40 23 | Interior Architectural Woodwork |
| 6. Section 07 24 13 | Water-Drainage Exterior Insulation and Finish System |
| 7. Section 08 11 13 | Hollow Metal Doors and Frames |
| 8. Section 08 41 13 | Aluminum-Framed Entrances and Storefronts |
| 9. Section 08 51 13 | Aluminum Windows |
| 10. Section 08 81 00 | Glass and Glazing |
| 11. Section 09 21 16 | Gypsum Board Assemblies |
| 12. Section 09 24 00 | Exterior Lathing and Plaster |
| 13. Section 09 91 13 | Exterior Painting |
| 14. Section 09 91 23 | Interior Painting |

1.02 REFERENCES

A. ASTM International (ASTM):

1. ASTM C510 - Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants.
2. ASTM C639 - Standard Test Method for Rheological (Flow) Properties of Elastomeric Sealants.
3. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer.
4. ASTM C679 - Standard Test Method for Tack-Free Time of Elastomeric Sealants.
5. ASTM C719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).

6. ASTM C793 - Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants.
 7. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.
 8. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
 9. ASTM C1382 - Standard Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints.
 10. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
 11. ASTM D2240 - Standard Test Method for Rubber Property - Durometer Hardness.
- B. California Department of Public Health
1. Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.
- C. NSF International (NSF)
1. Standard 51 - Food Equipment Materials.
- D. Sealant, Waterproofing, and Restoration Institute (SWRI).
1. SWRI Validation Program.
- E. U.S. Environmental Protection Agency (EPA)
1. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings.
- F. U.S. Food and Drug Administration (FDA)
1. 21 CFR 177.2600 - Title 21 Part 177 Indirect Food Additives: Polymers.
- G. US Green Building Council (USGBC)
1. Leadership in Energy and Environmental Design (LEED) Green Building Rating System.

1.03 SUBMITTALS

- A. Product or Material Data:
1. Manufacturer's Data:
 - a. Submit a complete material listing of items proposed to be installed under this Section.
 - b. Submit data to demonstrate that all materials meet or exceed the specified requirements.
 - c. Submit product specifications, installation instructions, and manufacturer's recommendations for the materials that will be installed.
- B. Samples: Two (2) representative units of each type, size, pattern, and color.

- C. Shop Drawings: Include details of materials construction and finish. Include relationship with adjacent construction.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum of five (5) years documented experience.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum of two (2) years documented experience.
- C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

1.05 PRE-INSTALLATION CONFERENCE

- A. Convene a conference approximately two (2) weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor or Construction Manager and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the jobsite in original, unopened containers with labels intact.
- B. Store only under conditions recommended by the manufacturers.
- C. Remove and dispose of material that has exceeded the shelf life recommended by its manufacturer.

1.07 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.08 WARRANTY

- A. Performance Requirements:
 - 1. The completed system shall form a positive barrier against passage of moisture into interior wall assemblies or behind fixtures and from exterior to interior building areas.
- B. Provide a written guarantee to maintain sealant/caulking in a watertight condition for a minimum period of 2 years.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General Purpose Building Sealant (window and door frames, plumbing fixtures, wet areas) (non-paintable):
 - 1. Silicone sealant meeting ASTM C920, Type S, Grade NS, Class 25, and Fed Spec. TT-S-001543:
 - a. Sonneborn Sonolastic Omniplus.
 - b. GE Silicones Construction 1200.
 - c. Dow-Corning 790.
 - d. Or approved equal.
- B. General Purpose Building Sealant (paintable):
 - 1. Latex sealant meeting ASTM C920, Type S, Grade NS, Class 25, and Fed Spec. TT-S-001543:
 - a. DAP Dynaflex 230.
 - b. Or approved equal.
 - 2. Silyl-terminated polyether sealant meeting ASTM C920, Type S, Grade NS, Class 25, and Fed Spec. TT-S-001543:
 - a. Sonneborn 150.
 - b. Or approved equal.
- C. Colors for each sealant shall be selected by the Architect from manufacturer's standard color range.
- D. Primers shall be non-staining and specifically recommended for the type of installation by their manufacturer.
- E. Backup materials shall be non-absorbent and non-staining, closed cell, and specifically recommended for the type of installation by their manufacturer.
- F. Bond prevention materials shall be recommended by the manufacturer for the sealant products used.
- G. Materials, not specifically described, but necessary to complete this work, shall be first quality.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed.
- B. Correct conditions are detrimental to the proper completion of the work.
- C. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Thoroughly clean surface.
- B. Sandblast or wire brush treated surfaces, if required, to obtain a clean, smooth surface.
- C. Insert approved backup material in the joint cavity to the depth required.
- D. Surfaces shall be wiped clean and dry prior to application to insure proper adhesion.
- E. Where the possibility of joint filler staining adjacent areas or materials exists, mask joints prior to application.
- F. Do not remove masking tape before joints have been tooled, and initial cure of joint filler has taken place.
- G. Work stained due to failure of proper masking precautions will not be accepted.

3.03 INSTALLATION OR APPLICATION

- A. Installation of Backup Material:
 - 1. Compress the backup material 25% to 50%.
 - 2. Avoid lengthwise stretching of the material.
 - 3. Do not twist or braid backup stock.
- B. Priming:
 - 1. Apply the primer in strict compliance with the manufacturer's recommendations.
- C. Bond Breaker Installation:
 - 1. Install a bond breaker where recommended by the manufacturer of the sealant.
- D. Installation of Sealants:
 - 1. Comply with manufacturer's recommended width-to-height ratios.
 - 2. Apply sealant under pressure to completely fill joints.
 - 3. Completely mask joints where the appearance of sealant on adjacent surfaces would be objectionable.
 - 4. Install the sealant in conformance with the manufacturer's recommendations.
 - 5. Tool all joints to the profile shown, or as directed by Architect.
 - 6. Joints shall be left smooth, uniform, and free of voids or air bubbles.

3.04 PROTECTION OR ADJUSTMENTS

- A. Protect the work and materials of all other trades.

3.05 CLEANING OR REPAIR

- A. Remove masking tape immediately after joints have been tooled and initial cure of joint filler has taken place.
- B. Clean adjacent surfaces.
- C. Use solvent or cleaning agent as recommended by the sealant manufacturer.

END OF SECTION 07 92 00

HOLLOW METAL DOORS AND FRAMES

SECTION 08 11 13

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1.
2. Hollow metal frames.
3. Hollow metal doors.
4. Hollow metal window frames.
5. Foam insulation sealing of metal frames.
6. Rebar doweling and grouting HM frames to slabs.
7. Certification of installation of water-resistive barriers at associated openings.
8. Submittal preparation.
9. Clean up.

B. Related Sections:

- | | |
|---------------------|---|
| 1. Section 05 41 00 | Structural Metal Stud Framing |
| 2. Section 06 10 00 | Rough Carpentry |
| 3. Section 06 20 00 | Finish Carpentry |
| 4. Section 07 24 13 | Water Drainage Insulations and Finish System Exterior |
| 5. Section 08 71 00 | Door Hardware |
| 6. Section 09 91 13 | Exterior Painting |

1.02 REFERENCES

A. American National Standards Institute (ANSI)

1. ANSI/SDI 100, Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI 119, Performance Test Procedures for Steel Door Frames and Anchors.
3. ANSI A151.1, Test Procedure and Acceptance Criteria for Physical Endurance, Steel Doors and Frames.
4. ANSI A224.1, Test Procedure and Acceptance Criteria for Prime-Painted Steel.

- B. ASTM International (ASTM)
 - 1. ASTM A 525, Specification for Steel Sheet, Zinc-Coated.
 - 2. ASTM E152, Fire Tests of Door Assemblies
- C. National Fire Protection Association (NFPA)
 - 1. NFPA 80, Standard for Fire Doors and Windows.
 - 2. NFPA 101, Life Safety Code
- D. Steel Door Institute (SDI)
 - 1. SDI 107, Hardware on Steel Doors, Reinforcement Application.
- E. California Building Code (CBC)
 - 1. Title 24
- F. Uniform Building Code (UBC)
 - 1. UBC 7-2, Fire Tests of Door Assemblies.
 - 2. UBC 7-4, Fire Tests of Window Assemblies.

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Shop Drawings or Layout Drawings:
 - 1. Submit copies of shop drawings for review by Architect prior to fabrication.
 - a. Indicate door and frame elevations, sections, materials, gauges, finish, fabrication/erection details, and locations of hardware, including reference to hardware sets and vision lites and louvers.
 - b. Show cross-references to architectural drawings/details.
 - c. Provide manufacturer's product and technical data sheets.
- C. Certification of Compliance:
 - 1. Provide a letter of certification that all materials comply with these Specifications.
- D. Samples:
 - 1. Submit as requested by Architect. Samples shall be returned after review.
- E. Substitutions:
 - 1. Make substitution requests in accordance with Section 01 60 00 "Product Requirements".

1.04 QUALITY ASSURANCE

A. Steel Door and Frame Supplier:

1. Direct factory supplier who employs a Certified Door Consultant (CDC) or person with equivalent experience, available at reasonable times during course of Work, for consultation to Owner, Architect, and Contractor.

B. Label Construction:

1. A physical label or approved marking shall be affixed to the fire door or fire door frame at an authorized facility as evidence of compliance with procedures of the labeling agency.

C. Sequencing and Scheduling:

1. Deliver doors and frames to the jobsite in a timely manner so as not to delay the progress of other trades.
2. Issue purchase orders to suppliers so as not to interfere with normal quoted delivery times.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Coordinate delivery to the appropriate locations (shop or field) for installation.

B. Storage of Doors:

1. Doors shall be stored in an upright position under cover. Place the units on at least 4" (101.6 mm) wood sills on floors in a manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters which create a humidity chamber and promote rusting. If the corrugated wrapper on the door becomes wet, or moisture appears, remove the wrapper immediately. Provide a 1/4" (6.35 mm) space between the doors to promote air circulation.

C. Storage of Frames:

1. Frames shall be stored under cover on 4" (101.6 mm) wood sills on floors in a manner that will prevent rust and damage. Do not use non-vented plastic or canvas shelters, which create a humidity chamber and promote rusting. Assembled frames shall be stored in a vertical position, five units maximum in a stack. Provide a 1/4" (6.35 mm) space between frames to promote air circulation.

D. Damage:

1. Inspect delivered items for damage. Minor damage may be repaired, provided repaired items are equal to new Work and accepted by the Architect. Provide new items when directed. Comply with VOC regulations when repairing damage.

1.06 PROJECT CONDITIONS

A. Environmental:

1. Packaging and Disposal:

- a. Package in biodegradable packs, paper or cardboard boxes. Dispose of non-biodegradable packs, plastic, Styrofoam, polystyrene, and polyurethane to a licensed or authorized collector for proper disposal. Comply with the applicable standards and laws for VOC.

1.07 WARRANTY

- A. Steel doors and frames supplied with a one (1) year warranty against defects in materials and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

1. Ceco Corp., Oakbrook, Illinois.
2. Curries Co., Mason City, Iowa.
3. Steelcraft Manufacturing Co., Cincinnati, Ohio.
4. Or approved equal.

2.02 MATERIALS

A. Steel Requirements:

1. Doors and frames manufactured of commercial quality, stretcher-leveled flatness, cold rolled steel per ASTM A366 and A568 general requirements. Internal reinforcing may be manufactured of hot rolled, pickled, and oiled steel per ASTM A569.

B. Coating Materials:

1. Primer:
 - a. Manufacturer's standard rust inhibiting primer to ANSI A224.1.

C. Doors:

1. Construction:
 - a. 16-gauge cold rolled steel.
 - b. Exterior doors and louvers shall be galvanized.
 - 1) Minimum zinc coating of 0.60 oz. / square foot (A60) per ASTM A-653.
2. Doors shall be flush with visible edge seams.
3. Out-swinging exterior doors shall be provided with top caps for protection against weather with flush-steel top.

4. Door Reinforcing:
 - a. Doors shall be mortised and adequately reinforced for all hardware per hardware manufacturer's recommendations.
 - 1) Drill and tap for mortised hardware.
 - b. Reinforced internally with a 12-gauge steel reinforcement for surface closers.
5. Core Materials:
 - a. Non-Rated Doors:
 - 1) Kraft/Paper Honeycomb or Polystyrene at the discretion of the manufacturer.
 - a) Polyurethane and Vertical Steel Stiffeners will not be accepted.
 - b) Internal reinforcing, manufactured of hot rolled, pickled, and oiled steel per ASTM A569.
 - b. Fire-Labeled Doors with temperature rise rating:
 - 1) Mineral fiber core, temperature rating per code.
6. Fire Labeled Doors:
 - a. Provide Underwriter's Laboratories factory-applied door labels when indicated on the drawings to be a part of a rated assembly.
7. Provide cutouts, trims, and/or stops for glazing where indicated on the Drawings.
 - a. Glazing for doors shall be provided per Section 08800 – Glass and Glazing.
 - 1) Exterior door: Exterior Door Glazing.
 - 2) Interior door: Tempered Polished Plate Glass
8. Astragals: Z Type

D. Frames:

1. Construction:
 - a. 14-gauge cold rolled steel.
 - b. Exterior frames shall be galvanized.
 - 1) Minimum zinc coating of 0.60 oz. / square foot (A60) per ASTM A-653.
2. Corner Construction:
 - a. Weld full depth and face, grind smooth, and re-prime
3. Provide temporary shipping spreaders to help protect frames from damage during transit and handling. Remove spreaders prior to setting frame.

E. Door Glass Light Frames:

1. Flush with door face, Lo Pro type, as manufactured by Anemostat, fabricated of 18-gauge steel.

F. Louver Openings:

1. Openings shall be factory cut.
 - a. Coordinate openings with hardware cutouts.
2. Louver assemblies shall be rated to match the fire rating of the door on which it is being installed.

3. Factory-supplied, through-bolted metal louver assemblies shall be used.
4. Louver assemblies shall be inverted split "Y" type constructed of 18-gauge steel complete with factory-applied primer finish.
 - a. Fire-rated louvers shall be Air Louvers Inc. #1900 A or equal, or Anemostat #FLDL-H
 - b. Non-rated assemblies shall be Anemostat #AFDL
 - c. Vents on exterior doors subject to vandalism shall be Anemostat #PLSL louver with 12 Ga. security grilles.

2.03 FABRICATION

- A. Doors and frames shall be fabricated by a single source under controlled factory conditions for uniform quality and appearance.
- B. Doors:
 1. Classification:
 - a. SDI:
 - 1) Grade Level: III
 - 2) Model: 2
 - 3) Gauge: 16
 - 4) Description: Extra Heavy Duty, Full Flush
 - a) CYCLES: 1,000,000
 2. Vertical Lock Edges:
 - a. Beveled 1/8 inch in 2 inches.
 - b. Manufacturer's standard interlocking and glued edge.
 3. Top and Bottom Channels:
 - a. Not less than 16-gauge, flush or inverted.
 - b. Welded to the face sheets.
 - c. Exterior doors:
 - 1) Flush steel top channel.
- C. Frames:
 1. Corner Construction:
 - a. Weld full depth and face, grind smooth, and re-prime.
 2. Provide temporary shipping spreaders to help protect frames from damage during transit and handling. Remove spreaders prior to setting frame.
- D. Frame Anchors:
 1. Attachment to Masonry Construction:
 - a. Galvanized
 - b. Adjustable, flat, corrugated, or perforated T-shaped, with leg not less than 2 inches wide by 10 inches long, or wire type, not less than 3/16 inches in diameter.

2. Attachment to Drywall Construction:
 - a. Steel or Wood Stud-type to accommodate frame jamb depth and face dimension on welded frame.
 - b. Weld anchors to frame.
3. Provide one anchor for every 30 inches of jamb or fraction thereof.
4. Floor Anchor:
 - a. Angle Clip Type:
 - 1) 16 gauge.
 - 2) Two fasteners per jamb.
 - 3) Weld to bottom of each jamb.
 - 4) Grouted rebar pins to concrete at base.
5. Preparation for Hardware:
 - a. Prepare frames to receive mortise-type hardware and hinges, locks, latches, or other hardware.
 - b. Verify hardware requirements with Section 08 71 00 "Door Hardware".
 - c. Reinforce per SDI 107.
 - d. Lock and closer reinforcement shall be box-type.
 - e. Door hinge reinforcement: 7 gauge or equivalent, manufacturer's standard.
 - f. Punch strike jambs to receive three silencers; double-leaf frames to receive manufacturer's standard preparation.
 - g. Hardware locations per "Recommended Locations for Builders' Hardware for Standard Steel Doors and Frames".
 - h. Provide welded-in-place guards for all hardware cutouts in frame.

2.04 FINISH

- A. Doors shall be thoroughly cleaned, phosphatized, and receive one coat of baked-on primer. Primer shall meet the requirements of ANSI A 224.1.
- B. Frames shall receive one (1) shop coat of air-dried, light gray, zinc chromate, rust-inhibitive primer before shipment.

PART 3 EXECUTION

3.01 SETTING FRAMES

- A. Verify all water-resistive barriers, flexible flashings, etc. are properly installed with proper watershed lapping prior to starting installation of frames.
- B. Set frames in accordance with SDI 105.
- C. Set welded frames in place prior to construction of adjacent partition work. Properly brace frame until permanent anchors are set.

- D. Install fire-rated frames in accordance with NFPA 80.
- E. Exterior door frames shall be set with a #4 rebar doweled into the slab, on each side, and grout filled to a point 12" above finished floor.
 - a. Grout shall be as per Type "S" mortar per ASTM C270, proportions based on loose volumes:
 - i. Portland Cement: 1 part
 - ii. Hydrated lime or lime putty: 1/4 part (min.) 1/2 part (max.)
 - iii. Sand (damp, loose volumes): Not less than 2 1/4 and not more than 3 times the sum of the separate volumes of cementitious materials.
 - b. Pre-mixed Grout (Mortar) Type "S" per ASTM C270
 - i. Amerimix
 - ii. Spec-Mix
 - iii. Or approved equal
 - c. Grout Strength:
 - i. Grout shall attain a minimum compressive strength of 1800 psi at 28 days.
- F. Exterior frames shall be filled all around with spray expanding polyisocyanurate foam for a complete fenestration seal between the frame and the structure.
 - a. Clean off excess foam so as not to interfere with silicone caulking between frames and trim pieces.

3.02 DOOR INSTALLATION

- A. Clearances:
 - 1. 1/8 inch between door and frame at head and jambs.
 - 2. 1/8 inch at meeting edges of pairs.
 - 3. 1/8 inch at transom panels, without transom bar.

4. 3/4 inch above finish floor at sills without threshold.

5. 1/4 inch at sill with threshold.

3.03 SEQUENCING AND SCHEDULING

- A. Deliver doors and frames to the jobsite in a timely manner so as not to delay progress of other trades.
- B. Issue purchase orders to suppliers so as not to interfere with normal quoted delivery times.

3.04 QUALITY CONTROL

- A. Exposed welds shall be ground smooth.
- B. Primer shall be applied after welding and grinding.

3.05 PROTECTION, ADJUSTMENT, AND CLEANING

- A. Protect work as necessary until completion and acceptance of building.
- B. Remove dirt and excess sealants, mortar, or glazing compounds from exposed surfaces.
- C. Adjust moving parts for smooth operation. Use shims as required.
- D. Fill dents, holes, etc. with metal filler and sand smooth and flush with adjacent surfaces. Paint to match adjacent surface.

3.06 CONDITION OF FINISHED WORK

- A. Heads and sills of the same height shall line up with each other.
- B. Doors and frames shall be set true and plumb.
- C. No sandpaper marks, hammer marks, or blemishes will be allowed.
- D. Space around doors shall be uniform on both sides and top.

END OF SECTION 08 11 13

RESILIENT FLOOR COVERING SECTION 09 65 00

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1;
 - 2. Preparation of slabs or sub-floors;
 - 3. Preparation of submittals;
 - 4. Clean up.
- B. Related Sections:
 - 1. Section 06 20 00: Finish Carpentry

1.02 SUBMITTALS

- A. Product or Material Data:
 - 1. Submit product description and test data for all proposed products or materials for review and acceptance by Architect prior to start of work.
- B. Samples or Mockups:
 - 1. Submit one (1) complete set of color selection samples of proposed materials for color selection by Architect prior to ordering materials.
- C. Shop Drawings or Layout Drawings:
 - 1. Submit a diagram showing the layouts of all proposed flooring material seams or joints for review by the Architect prior to installing material.
- D. Closeout Documents:
 - 1. Maintenance instructions.

1.03 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Static Coefficient of Friction:
 - a. Resilient flooring to have minimum coefficient of friction of at least 0.6.
 - 1) Test shall be based on ASTM D2047 James Slip Test, Shoe Material – Official Test Leather.
 - 2. Flammability:
 - a. ASTM E648.
 - b. ASTM E662.
 - 3. Material Fabrication:
 - a. Vinyl Composition Sheet:
 - 1) ASTM F1303, Type II, Grade 1, Class A backing.

- b. Linoleum Tile or Sheet:
 - 1) ASTM F 2034, Type I.
 - 4. Health:
 - a. ASTM D2859.
- B. Warranty:
 - 1. Contractor's 1-year per General Conditions.
 - 2. Manufacturer's 7-year warranty on welded seam resilient sheet flooring.
- C. Environmental Requirements:
 - 1. Contractor shall ensure that temperatures, relative humidity, and other environmental conditions for material storage, handling, and installation are maintained within the manufacturer's suggested limits.
 - 2. Provide adequate lighting for proper installation of materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Enhanced Resilient Tile
 - 1. Glue-down floor Covering, 2.5mm thickness, a 20 mil commercial wear layer with an M-Force Enhanced Urethane finish
 - a. ~~Mohawk Group Matute Plus C0101, 915A Frostbite Stone, size 12"x24"~~
 - 2. Or approved equal.
- B. Rubber Top Set Base:
 - 1. BurkeBase molded rubber wall base;
 - 2. Roppe, TS extruded rubber cove base;
 - 3. Or approved equal.

2.02 MATERIALS

- A. Resilient Sheet Flooring:
 - 1. Sheet flooring submitted for color/pattern selection shall meet every minimum standard for material listed below. Any flooring failing to meet one of these minimum standards will be rejected.
- B. Welded Seam Resilient Safety Sheet Flooring:
 - 1. Slip-resistance sheet vinyl containing aluminum oxide and/or carborundum chips mixed throughout wear surface with silicon carbide on the surface and fiberglass mesh on back.
 - a. Provide breathable underlayment as recommended by manufacturer.
 - b. Metal trim caps shall be anodized extruded aluminum.
 - c. Heat weld strips shall be color matching vinyl.
 - d. Cove formers. (Altro #38R or equal)
 - e. Gully angles. (Altro GE25 or equal)

- f. Color and/or pattern shall be selected by Architect from manufacturer's standard colors.
 - 1) Manufacturer submitted shall have a minimum of 24 standard colors/patterns.
- g. Homogenous sheet vinyl flooring shall conform to the requirements of ASTM F1303, Type II, Grade 1, Class A backing.
- h. Static load limit per ASTM F970 shall be a minimum of 850 pounds per square inch.
- i. Resilient safety sheet flooring shall have resistance to chemicals (when surface is immersed for 24 hours) as follows:
 - 1) Alkalies (Soda, Caustic Soda, Ammonia, Lye): No Effect
 - 2) Dilute Acids (Hydrochloric, Nitric, Sulfuric, Acetic): No Effect
 - 3) Blood, Vomit, Excrement, Urine: No Effect
 - 4) Fruit Juice, Milk, Cream, Soft Drinks, Beer, Wine: No Effect
 - 5) Animal fats, Grease, Alcohol, Seawater: No Effect
 - 6) Chocolate, Coffee, Tea: No Effect
 - 7) Concentrated Acids (Hydrochloric, Nitric, Sulfuric): Staining
 - 8) Organic Solvents (Acetone Ethyl Acetate, Toluene): Softening
 - 9) Iodine, Betadine: Staining
- j. Provide manufacturer's solid color and/or patterned color vinyl weld rod as required for color/pattern selected and intended for heat welding of seams.
 - 1) Color shall be compatible with field color of flooring or as selected by Architect to contrast with field color of flooring. Color selected from the range currently available from submitted manufacturer.

2.03 ACCESSORIES AND HARDWARE

- A. Accessories and hardware shall be used as recommended by the manufacturer and as detailed to create a complete installation.
- B. Rubber Top Set Base:
 - 1. 4" high 1/8" thick thermoset vulcanized rubber with molded outside corners.
 - a. Use 6" high where indicated on Drawings.
 - 2. Conform to Fed. Spec. SS-W-40A.
 - 3. Plastic or vinyl base material will not be accepted.
- C. Adhesive:
 - 1. Conform to the flooring manufacturer's latest written recommendations.
- D. Floor Filler and Patch:
 - 1. Portland cement-based resin.
 - a. Gypsum-based materials will not be allowed.
 - b. Minimum compressive strength: 4000 psi per ASTM 349/157.
 - c. 4,000 psi per ASTM 349/157.

- E. Metal Trim:
 - 1. Conform to the flooring manufacturer's latest written recommendations. Trimedge. Chromedge, Futura, extruded white metal molding of shapes and designs indicated on the drawings and/or as herein specified.
- F. Cove Base Cap Trim:
 - 1. Futura Industries or approved equal
 - a. Extruded aluminum type CM 406 or CM 903 as applicable

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine slabs and sub-floors for acceptability for the flooring to be installed.
 - 1. Notify General Contractor or Construction Manager and Architect of any unacceptable conditions prior to installing flooring.
 - 2. Do not install flooring over unacceptable subsurface. Application of flooring indicates acceptance of the underlying slab or sub-floor. Contractor is responsible for replacement and/or guaranty of flooring installed over unacceptable slabs or sub-floors.
- B. Perform Calcium Chloride and bonding tests on concrete slab as specified by flooring manufacturer to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring.

3.02 PREPARATION

- A. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring. Make sub-floor free from dust, dirt, grease, and all foreign materials.
- B. Repair flaws or defects in slabs or substrate. Smooth concrete surfaces, removing rough areas, projections, ridges, bumps, and filling low spots, control, or construction joints, and other defects with Floor Filler as specified in this Section.
- C. Maintain a smooth surface.
- D. Welded Seam Resilient Sheet Flooring and Homogenous Sheet Vinyl:
 - 1. Saw cut concrete around floor drains and/or floor sinks as required for proper installation of gully angles at welded seam resilient sheet flooring. Heat weld gully angles to sheet flooring.

3.03 DELIVERY, STORAGE, AND HANDLING

- A. Handling, storage, and installation of the materials covered under this Section of the specifications shall be performed in accordance with the manufacturer's latest written requirements.

3.04 SEQUENCING AND SCHEDULING

- A. Sequence work to avoid potential damage from other trades, such as painting or overhead work.

3.05 INSTALLATION OR APPLICATION

- A. Installation shall be in accordance with the manufacturer's latest written recommendations.
 - 1. Resilient Sheet Flooring shall be coved 6" unless shown otherwise.
 - a. Install cap strip using contact adhesive and 3d stainless steel nails at 16" on center.
- B. Roll flooring into wet adhesive with a minimum 100# roller.
- C. Joints shall be straight, tight, and shall align with adjacent walls.
 - 1. Completely weld seams of welded seam resilient sheet flooring joints, including coved areas.
- D. Lay out flooring to minimize seams.
- E. Sheet Flooring:
 - 1. Install flooring in strict accordance with the latest edition of manufacturer's installation instructions.
 - 2. Install flooring wall to wall before the installation of floor-set cabinets, casework, furniture, equipment, movable partitions, etc. Extend flooring into toe spaces, door recesses, closets, and similar openings as shown on the drawings.
 - 3. If required, install flooring on pan-type floor access covers. Maintain continuity of color and pattern within pieces of flooring installed on these covers. Adhere flooring to the subfloor around covers and to covers.
 - 4. Scribe, cut, and fit or flash cove to permanent fixtures, columns, walls, partitions, pipes, outlets, and built-in furniture and cabinets.
 - 5. Adhere flooring to the sub-floor without cracks, voids, raising, and puckering at the seams. Use manufacturers recommended adhesive with resistance to high moisture content. Roll with a 100-pound roller in the field areas. Hand-roll flooring at the perimeter and the seams to assure adhesion. Refer to specific rolling instructions of the flooring manufacturer.
 - 6. Lay flooring to provide a minimum number of seams. Avoid cross seams, filler pieces, and strips. Match edges for color shading and pattern at the seams in compliance with the manufacturer's recommendations.

7. Install flooring with adhesives, tools, and procedures in strict accordance with the manufacturer's written instructions. Observe the recommended adhesive trowel notching, open times, and working times.
8. Prepare heat-welded seams with special routing tool supplied for this purpose and heat weld with vinyl welding rod in seams. Use methods and sequence of work in conformance with written instructions of the flooring manufacturer. Finish all seams flush and free from voids, recesses, and raised areas.
9. Provide integral flash cove wall base unless shown otherwise on the drawings, including cove fillet support strip and top edge cap trim. Construct flash cove base in accordance with the flooring manufacturer's instructions. Heat weld seams as specified for those on the floor.

3.06 QUALITY CONTROL

- A. Field Inspection:
 1. Project Inspector.
 2. Architect of Record.

3.07 CLEANING OR REPAIR

- A. Keep premises clean during the progress of the work.
- B. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.
- C. Thoroughly clean up work and adjacent areas upon completion of the work.
 1. Sweep and vacuum areas clean.
 2. Remove tools, excess materials, and debris from site.

3.08 EXTRA STOCK

- A. Contractor shall provide 1.5% of uncut extra stock of each product used per this specification. One 1 qt. can of flooring adhesive and One 1 qt. can of RTSB glue shall be given to District for future use. All cans shall be new and unopened.

END OF SECTION 09 65 00

RESINOUS FLOORING

SECTION 09 67 23

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes: Provide a complete Urethane cement floor system for interior concrete surfaces that meet the requirements for specific use indicated in the contract documents. Include all applicable substrate testing, surface preparation, and detail work.

1.2 RELATED SECTIONS

- A. Section 03 39 00 Concrete Curing

1.3 SYSTEM DESCRIPTION

- A. The scope of work shall entail substrate preparation, the provision and application of a self-leveling, seamless urethane cement with aggregate broadcast with topcoat.
- B. The overall system will feature the desired color and nominal thickness of 5/16". The specified system will be applied to the prepared area(s) as indicated in the plans and per the manufacturer's recommendations.
- C. Cove base (as required) should be installed as indicated on the plans and per the manufacturer's recommendations, unless otherwise noted.

1.4 SUBMITTALS

- A. Product Data: Submit latest version of manufacturer's product and system data, including physical properties, color charts, representing manufacturer's full range of colors, textures, and thicknesses.
- B. Manufacturer's Safety Data Sheets (SDS) for each product.
- C. Selection Samples: For the proposed system, provide two sets of samples of a minimum 3"x3", representing the color, texture, thickness, and general appearance of the system subject to normal tolerances.

1.5 QUALITY ASSURANCE

- A. All materials used in the resinous floor system shall be manufactured and provided by a single manufacturer to ensure compatibility and proper bonding.
- B. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the work of this section.
- C. Applicator shall have a minimum of 3 years' experience installing resinous flooring coatings similar to that which is required for this project and who is acceptable to the manufacturer.

1. Applicator shall designate a single individual as project foreman who shall be on site at all times during installation.
 2. Applicator must show and have QCA Qualified Contractor/Applicator paperwork from the manufacturer of the coating system, as required to obtain a long-term jobsite specific warranty.
- D. Convene a pre-application meeting before the start of application of coating system. Require attendance of parties directly affecting work of this section, including: Architect, contractor, applicator, and authorized representative of the coating system manufacturer and interfacing trades. Review the following:
1. Drawings and specifications affecting work of this section.
 2. Protection of adjacent surfaces.
 3. Surface preparation and substrate conditions.
 4. Application.
 5. Field quality control.
 6. Protection of coating system.
 7. Repair of coating system.
 8. Coordination with other work.
- E. No requests for substitutions shall be considered that would alter the general type of the specified system.

1.6 DELIVERY, STORAGE & HANDLING

- A. Delivery: Materials shall be delivered to the job site in sealed, undamaged containers. Each container shall be clearly marked with manufacturer's label showing type of material, color, and lot number.
- B. Storage:
1. Store all materials in a clean, dry place.
 2. Materials should be stored between 60-75°F. Do not store in direct sunlight or high heat.
 3. Do not allow any material to freeze.
 4. Safety Data Sheets (SDS) for all products and materials shall be kept on site.
- C. Handling: Handle products carefully to avoid damage to the containers. Read all labels, production specification sheets, system specification sheets and Safety Data Sheets (SDS) prior to use.

1.7 ENVIRONMENTAL CONDITIONS

- A. Site Requirements
1. Maintain environmental conditions (temperature, humidity, and ventilation) within the limits recommended by the manufacturer.
 2. Concrete should be tested for moisture before applying a seamless coating. Temper-Crete SLQ (at a minimum 3/16", broadcast at 1/4") is suitable for moisture vapor transmission up to 20 lbs./1000 square feet (ASTM F1869) or 99% relative humidity (RH) (ASTM F2170).
 3. Concrete must be at least 3500 psi.

4. Concrete must be cured for a minimum of 14 days before coating is applied.
 5. Schedule coating work to avoid excessive dust and airborne contamination. Protect work areas from excessive dust and airborne contamination during coating application.
 6. Before any work is started, the applicator shall examine all surfaces for any deficiencies. Should any deficiencies exist, the architect, owner or general contractor shall be notified in writing and any corrections necessary shall be made.
 7. The applicator shall provide sufficient lighting during the prep and installation of the system, equivalent to the final lighting.
- B. Requirements for new concrete that will be coated with urethane cement.
1. All concrete shall be moisture cured for at least 7 days and have fully cured for a minimum of 14 days, in accordance with ACI-308 prior to the application of the system and pending moisture testing.
 2. Concrete should have a flat rubbed finish, float, or light steel trowel finish. Hard steel trowel finishes are not required or advisable.
 3. Sealers and or curing agents are not to be used.
 4. All concrete surfaces that are on grade shall, should be constructed with a vapor barrier to protect against the effects of vapor transmission and the concerns with delamination of the system

2.1 FLOORING

- A. As a basis of design: Westcoat Temper-Crete SLQ System, self-leveling urethane cement flooring system.
1. System Materials:
 - a. Resin & Hardener: EC-24 Temper-Crete Urethane
 - b. Cement: TC-24 Temper-Crete SL Cement
 - d. Broadcasted Aggregate: TC-65 Quartz Sand
 - e. Epoxy Grout Coat: EC-36 100% Solids Epoxy & CA-36 Epoxy Color Pack
 - f. Polyurethane Topcoat: EC-95G Polyurethane Topcoat
 - g. Skid Resistance CA-33 Aluminum Oxide at all areas.

2.2 MANUFACTURERS

- A. Approved manufacturer: Westcoat Specialty Coatings; 4007 Lockridge Street, San Diego, CA 92102. Telephone 800-250-4519. Fax 619-262-8606. Website: www.westcoat.com.
- B. Approved equal

2.3 PRODUCT REQUIREMENTS

- A. Temper-Crete System
1. Adhesion to Concrete: ASTM D4541, concrete fails.
 2. Compressive Strength: ASTM C-579, 11,200 psi.

3. Tensile Strength: ASTM C-307, 3,100 psi.
4. Flexural Strength: ASTM C-580, 6,100 psi.
5. Impact Resistance: ASTM D-2794, >160 in/lbs.
6. Hardness: ASTM D-2240, Shore D, 84.
7. Flammability: ASTM E-648, Class I.
8. Water Absorption: ASTM C-413, <0.1%.
9. Abrasion Resistance: ASTM D-4060, 34 mg loss.
10. Resistance to Fungi Growth: ASTM G21, Rated 0 (no growth).
11. Resistance to Mold Growth: ASTM D-3273, Rated 10 (highest resistance).

3.2 PREPARATION

A. General

1. All concrete substrates shall be clean, dry, and free of grease, paint, oil, dust, curing agents or any foreign material that will prevent proper adhesion. Any laitance or weak layers of concrete shall be removed prior to application.
2. Moisture Testing: All concrete should be tested for moisture before applying seamless coating.
 - a. Perform relative humidity test in accordance with ASTM F2170. If relative humidity (RH) exceeds 99%, contact the manufacturer before application.
 - b. Perform moisture vapor emission rate measurement in accordance with ASTM F1869. If vapor drive exceeds 20 lbs./1,000 sq. ft./24 hrs., contact the manufacturer before application.
3. Mechanical Surface Preparation
 - a. Prepare surfaces using methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
 - b. Create a surface profile of CSP 3-5 as described by the International Concrete Repair Institute (ICRI).
 - c. Anchor grooves/keyways should be cut six inches from all free edges, walls, perimeters, drains and both sides of joints.
 - d. Cracks, spawls and other imperfections in the substrate should be treated per manufacturers' recommendations.
 - e. Joints: Moving expansion joints should be honored and treated per manufacturers' recommendations.
 - f. Clean Surfaces thoroughly prior to installation.

3.3 APPLICATION

- A. Install coatings in accordance with the most up-to-date manufacturer's instructions.
- B. Mix multi-component materials in accordance with manufacturer's instructions.
- C. Use application equipment, tools, and techniques in accordance with manufacturer's instructions.

- D. Uniformly apply coatings at spread rates and in number of coats to achieve specified mil thickness recommended by the manufacturer.
- 1. Install integral coved base where indicated on the contract drawings and according to manufacturer's instructions.
- 2. All terminations, transitions, and details such as: drains, walls and doorways shall be treated per the manufacturer's recommendations.
- E. Adhere to all limitations, instructions, and cautions for resinous coatings as stated in the manufacturer's published literature.

3.5 FIELD QUALITY CONTROL

- A. Verify coatings and other materials are as specified.
- B. Verify coverage rates of the system as work progresses. Areas found not to meet the required thickness shall receive additional material until specified thickness is attained.
- C. Manufacturer's representative shall provide technical assistance and guidance for surface preparation and application of coating systems.

3.6 PROTECTION AND CLEAN-UP

- A. Light foot traffic should be permitted after 18 hours. Heavy traffic and exposure to moisture and chemicals should be permitted after 72 hours.
- B. Protect finished surfaces of coating system from damage during construction.
- C. Touch-up, repair or replace damaged flooring system after substantial completion.
- D. Clean area and remove all debris upon completion of work. Dispose of empty containers properly according to current Local, State and Federal regulations.

3.7 MAINTENANCE

- A. Contractor shall provide to the owner maintenance, and cleaning instructions for the floor system upon completion of work. The owner is required to clean and maintain the surfaces to maintain the manufacturer's warranty.

END OF SECTION 09 67 23

EXTERIOR PAINTING SECTION 09 91 13

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1.
2. Surface Preparation:
 - a. Sanding, scraping, putty work, and cleaning of work to be painted.
 - b. Washing, priming, and backpriming of sheet metal work.
3. Painting, staining, and clear finishing, except factory finished materials:
 - a. Exterior surfaces.
 - b. Woodwork, metal work, and trim.
 - c. Mechanical and electrical equipment and piping.
 - 1) Electrical items to be painted include conduit, fittings cabinets, panels, enclosures, junction and pull boxes, hangers, and other associated electrical items which are in "public spaces" and are therefore visible to the building occupants.
 - 2) Mechanical items to be painted shall include, but not be limited to:
 - a) Exposed piping, vessels, ductwork. Color coding of piping per the mechanical specifications.
 - d. Other normally painted surfaces.
 - e. If the color of finish is not specifically listed on the Color Schedule, the Architect shall select from standard colors and finishes available.
 - f. Existing work shall be painted where specified.
4. Backpriming of wood and metal work.
5. Sealing of masonry or concrete surfaces.
6. Painting and special coatings on exposed concrete block surfaces.
7. Electrostatic painting of ornamental metal, handrails, fences, gates, and guardrails..
8. Spray painting of roof and smoke hatches, roof accessories.
9. Touch-up painting.
10. Labor, materials, tools, and equipment.
11. Preparation of submittals.
12. Clean up.

B. Related Sections:

1. Section 05 12 00: Structural Steel Framing
2. Section 08 11 13: Hollow Metal doors and Frame

1.02 REFERENCES

- A. American National Standards Institute (ANSI)**
1. Performance Standards.

- B. ASTM International (ASTM)
 - 1. ASTM D16 – Standard Terminology for Paint, Related Coatings, Materials and Applications.
 - 2. ASTM D523 – Standard Test Method for Specular Gloss.
- C. California Building Code (CBC)
 - 1. CBC 2022 Edition,
- D. California Green Building Standards Code (CGBSC)
 - 1. CGBSC 2022 Edition, Title 24, Part 11.
- E. San Joaquin Valley Air Pollution Control District (SJVAPCD).
- F. Surface Preparation Standards and Specifications (SSPC)
 - 1. SSPC (PM1) – Steel Structure Painting Manual, Vol. 1, Good Painting Practice.
 - 2. SSPC (PM2) – Steel Structures Painting Manual, Vol. 2 Systems and Specifications.

1.03 DEFINITIONS

- A. Blocking: Two painted surfaces sticking together such as a painted door sticking to a painted jamb.
- B. DFT: Dry Film Thickness of the coating.
- C. DTM: Paint that is applied Direct to Metal.
- D. Enamel: Acrylic (water) or alkyd (oil) base paint which dries leaving an eggshell, pearl, satin, semi-gloss or high-gloss enamel finish,
- E. Gloss/Sheen Levels:
 - 1. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
 - 2. Gloss Level 2: Not more than 10 units at 60 degrees and 35 units at 85 degrees, according to ASTM D 523.
 - 3. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
 - 4. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
 - 5. Gloss Level 5: 35 to 70 units at 60 degrees according to ASTM D 523.
 - 6. Gloss Level 6: 70 to 85 units at 60 degrees according to ASTM D 523.
 - 7. Gloss Level 7: More than 85 units at 60 degrees according to ASTM D 523.
- F. Mildew Resistant: Certified products are specially formulated with microbicidal additives that resist mold, mildew and algae growth on the paint film and inhibit growth of bacterial odors.
- G. PDCA: Painting & Decorating Contractors of America www.pdca.org.

- H. RAVOC: Reactivity adjusted VOC 'Reactivity means the ability of a VOC to promote ozone formation.
- I. SSPC: SSPC Surface Preparation Standards and Specifications www.sspc.org.
- J. VOC: Volatile Organic Compounds found in primers, paints, sealers and stains.

1.04 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product or Material Data:
 - 1. Submit product description and test data for all proposed products or materials for review and acceptance by Architect prior to start of work.
 - 2. Submit preparation, priming, and application instructions for each material proposed for use over job specific substrates.
 - 3. Substitutions shall show a line-by-line-item review between the substituted product and the specified product for comparison and the specified Dunn-Edwards or Glidden Professional product in the paint schedule. The comparison shall include:
 - a. % Titanium Dioxide
 - b. % Solids by Weight
 - c. Type of vehicle
 - d. Solvent type
 - e. VOC content - Also list allowance per the Calif. Green Building Code
 - f. Finish
 - g. MPI rating
 - h. Scrub test results
 - 4. It will be the discretion of the Architect to accept proposed substitutions.
- C. Samples or Mockups:
 - 1. Submit a complete set of color selection samples of proposed materials for color selection by Architect prior to ordering materials.
 - 2. Submit 8"x10" minimum size brush-out color samples of colors selected for use by the Architect.

1.05 QUALITY ASSURANCE

- A. Performance Requirements:
 - 1. Complete coverage, void of blemishes.
- A. Regulatory Compliance:
 - 1. Materials must meet the standard set by the State of California for environmental protection and hazardous material content.
 - 2. 2022 CBC Chapter 8 "Interior Finishes", Section 803 "Wall and Ceiling Finishes":

- a. Finish of interior materials shall meet minimum Fire Classification (non-sprinklered spaces):
 - 1) Interior exit stairways, ramps and exit passages:
 - a) Class 'A' (flame spread index 0-25; smoke developed 0-450).
 - 2) Corridors and enclosure for exit access stairways and ramps:
 - a) Class A (flame spread index 0-25; smoke developed 0-450).
 - 3) Rooms and enclosed spaces:
 - a) Class B (flame spread index 26-75; smoke developed 0-450).
- 3. 2022 California Green Building Standards Code (CGBSC).
- B. Single Source Responsibility:
 - 1. Provide primers and undercoat products from the same manufacturer as the finish coats.
 - 2. Review other sections in which primers are provided to ensure compatibility of the total coating systems for various substrates. On request, furnish information on characteristics or finish materials to ensure use of compatible primers.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified with a minimum of ten (10) years of documented experience.
- D. Applicator Qualifications: Company specializing in performing the type of work specified with a minimum of five (5) years of documented experience and approved by manufacturer.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Contractor shall ensure that temperatures, relative humidity, and other environmental conditions for material storage, handling, and installation are maintained within the manufacturer's suggested limits.
 - 1. Apply water-based paints only when the temperature of surfaces to be painted and air temperatures is between 50- and 90-degrees F.
 - 2. Apply solvent-based paints only when the temperature of the surfaces to be painted and the air temperature is between 45- and 95-degrees F.
 - 3. Do not apply paints in snow, fog, rain, or misty conditions when the relative humidity exceeds 85% or when temperatures are less than 5 degrees above the dew point, or to damp or wet surfaces.
- B. Provide adequate lighting for proper installation of materials.
- C. Provide adequate ventilation for proper installation of materials.
- D. Paints, primers, and thinners shall not contain any organic compounds or metals prohibited for use in these products in California.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Handling, storage, and application of the materials covered under this Section of the specifications shall be performed in accordance with the manufacturer's latest written recommendations.
- B. Materials shall be delivered to the site in original unopened containers showing the brand name and product identification number, date of manufacture, color name and number, and VOC content.
- C. Rejected materials shall be immediately removed from the site.
- D. Take precautions to minimize the potential for accumulation of paint fumes and the potential for fire.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperature for Latex Paints: 50° F for exterior unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 foot-candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable manufacturers.
 - 1. Benjamin Moore; Montvale, NJ.
 - 2. Carboline; St. Louis, MO.
 - 3. Devoe Coatings; Santa Fe Springs, CA.
 - 4. Dunn Edwards; City of Commerce, CA.
 - 5. Glidden Professional; Cleveland, OH.
 - 6. PPG Paints, Pittsburgh, PA
 - 7. Sherwin Williams; Cleveland, OH.
 - 8. Tnemec Industrial Coatings; Kansas City. MO.

2.02 MATERIALS

- A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.

1. Provide paints and finishes of a soft past consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties and capable of drying or curing free of streaks or sags.
- B. Use only the highest quality products from the manufacturer's product line.
 1. Do not reduce, thin or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- C. All coats shall be the products of the same manufacturer.
- D. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- E. Colorants: The use of colorants containing hazardous chemicals, such as ethylene glycol, is prohibited.
- F. Flammability: Comply with applicable code for surface burning characteristics.
- G. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by the Architect from the manufacturer's full line.
- H. Colors: Refer to "Color Schedule".

2.03 ACCESSORY MATERIALS

- A. Accessory materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect all surfaces to receive paint.
- B. Application of paint indicates an acceptance of the underlying surface.
 1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 2. Concrete: 12 percent
 3. Masonry (Clay and CMU): 12 percent
 4. Wood: 15 percent
 5. Portland Cement Plaster: 12 percent

- C. Portland Cement Plaster Substrates: Verify that plaster is fully cured, including pH testing to determine that alkalinity is within limits established by the manufacturer.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.02 PREPARATION

- A. General:
 - 1. Remove hardware and hardware access, plates, machined surfaces, light fixtures, and similar items in places that are not to be painted or provide surface-applied protection prior to surface preparation and painting. Remove these items if necessary for complete painting of the items and adjacent surfaces. Coordinate removal of items with the appropriate trade and Construction Manager. Clean surfaces before applying paint or surface treatments. Remove oils and grease from surfaces prior to final cleaning of surfaces.
 - a. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - 2. Schedule cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces. Items shall be reinstalled in the same manner that they were removed.
 - a. Remove incompatible primers and re-prime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- B. Concrete, Masonry, and Stucco:
 - 1. Prepare concrete, masonry, and stucco surfaces to be painted by removing efflorescence, caulk, dust, dirt, grease, oils, and other forms of release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - a. Use abrasive blast cleaning methods if recommended by the paint manufacturer.
 - b. Determine alkalinity and moisture content of surfaces by performing appropriate test. Pay special attention to concrete masonry unit mortar joints and patch concrete surfaces with Ardex or other approved patching compounds. If surfaces are sufficiently alkaline to cause blistering and burning of finished paint, correct the condition before application per manufacturer's recommendation. Do not paint surfaces where moisture content of surfaces exceeds that permitted in the manufacturer's printed directions.

- c. Clean concrete floors to receive paint or coatings with a 5% muriatic acid. Flush the floor with water to remove the acid, neutralize with ammonia, then water rinse and allow drying before painting.

C. Metal:

1. Remove oil grease, mill scale, rust, corrosive materials, and other soluble contaminants using solvents, or cleaning compounds in conjunction with wiping, dipping, steam cleaning, or degreasing.
2. Wash and etch galvanized material.
3. Touch up any abrasions or chips in mill finish prior to application of finish, assuring compatibility of touch-up and patching material with subsequent paint system to be applied.
4. Follow the Structural Steel Painting Council (SSPC) recommendations.
5. Prime the surfaces immediately after preparation.
6. For aluminum substrates, remove loose surface oxidation.

D. Wood (Painted):

1. Ensure that moisture content of wood is within required limits, 15% maximum.
2. Scrape and sand material to remove dirt, oil, sap, or other materials which will affect the finish coat.
3. Remove any mill glaze by sanding. Wetting of surface and letting dry for 2-3 days, then sanding may be required if heavily glazed.
4. Prime and backprime all material.

E. Wood (Stained):

1. Ensure that moisture content is within required limits, 15% maximum.
2. Sand material to remove dirt, oil, sap, or other materials that will affect the finish coat. Finish sanding with a 150 fine grit minimum fineness.
3. Remove any mill glaze by sanding. Wetting of surface and letting dry for 2-3 days, then sanding may be required if heavily glazed.
4. Seal all knots and pitch streaks.

3.03 SEQUENCING AND SCHEDULING

- A. Sequence work to avoid potential damage from other trades.

3.04 INSTALLATION OR APPLICATION

A. Performance Requirements:

1. Complete coverage, void of blemishes.

B. Apply paint per Section 3.09 "PAINT SCHEDULE" at the end of this spec section.

C. Application shall be in accordance with the manufacturer's latest written recommendations.

D. Mixing and Thinning: Unless otherwise recommended by the manufacturer, paints may be thinned immediately prior to application with an approved manufacturer's

thinner and used only within recommended limits of the printed directions when necessary to suit conditions of surface temperature, weather, and application methods. The use of thinner shall not relieve the Contractor from obtaining complete hiding, film thickness, or required gloss. Paints of different manufacturers shall not be mixed.

E. Additional Requirements:

1. Each coat shall be tinted in a slightly different shade.
2. Paint areas visible through grills, screens, or registers flat black.
3. Door tops, bottoms, and edges shall receive the same finish as door faces.

F. Exposed plumbing, and plumbing fixtures not factory finished, shall be painted as specified for metal work.

G. Shop-primed structural steel to be painted shall receive an additional field-applied primer coat per the schedule below. The shop coating shall be considered as a protective coat to inhibit rust during storage and erection. Prior to re-priming, clean all surfaces per SSPC SC-1 with non-petroleum based solvent cleaner.

H. Block fillers: Provide block fill as scheduled to conform to the following per PDCA Standard P 12-05:

1. Level 3 – Premium fill: One or multiple coats of high-performance block filler manufactured to be applied at a high dry film build. Block filler shall be back rolled to eliminate voids and reduce the majority of the masonry profile depth.

I. Paint may be sprayed when approved by Architect. Non-metal surface (when allowed to be sprayed) must be properly back brushed or rolled.

1. Doors and hollow metal frames shall be spray painted.
2. Wrought iron fences, gates, and handrails not called out as hot-dipped galvanized, shall be spray painted with an electrostatic paint process

J. Surfaces not exposed to view shall be painted the same as the first coat of finish specified.

K. Finish tops, bottoms, edges, and ends of wood doors as specified for woodwork.

- L. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed to view:
 - a. Equipment, including panelboards and switchgear.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduits.
 - f. Plastic conduits.
 - g. Tanks that do not have factory-applied final finishes.
 - h. Other items as directed by Architect.
- M. Surfaces for Which Painting is Prohibited:
 - 1. Sprinkler heads.
 - 2. Electrical cover and switch plates.
 - 3. Heat, smoke, and carbon dioxide sensors or similar equipment.
 - 4. Escutcheon plates.
 - 5. Painting shall not obscure manufacturer's labels, UL, FM, or other code-required labels, identifying color banding, nameplates, or other identification features.
 - 6. Factory-finished items, unless specifically listed to receive a different finish.
 - 7. Glass, brass, or chrome-plated portions of fire protection system control valves, hydrants, and fire department connections

3.05 QUALITY CONTROL

- A. Tolerances:
 - 1. No holidays, sags, runs, crawls, brush marks, or other blemishes.
 - 2. All primers and finish coats shall be applied at manufacturers recommended spread rates to produce manufacturer's recommended dry film thickness per coat.
- B. Field Inspection:
 - 1. Project Inspector
 - 2. Construction Manager
 - 3. Architect of Record
- C. Dry Film Thickness Testing: Owner may engage the service of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.06 CLEANING OR REPAIR

- A. Keep premises clean during the progress of the work.
- B. Painting shall not occur during dusty conditions.
- C. Thoroughly clean-up work and adjacent areas upon completion of the work.
 - 1. Sweep areas clean.
 - 2. Remove tools, excess materials, and debris from site.
 - 3. Remove spilled or spattered paint.
- D. Touch up all scratched or damaged paint.
- E. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing and refinishing, as approved by Architect and leave in an undamaged condition.

3.07 CONDITION OF FINISHED WORK

- A. Complete coverage.
- B. Sharp, true lines and edges.

3.08 EXTRA STOCK

- A. Contractor shall provide extra stock of 5% of each type of paint/coating and color used in new unopened 1-quart containers.

3.09 PAINT SCHEDULE (Based on Dunn-Edwards Paints)

- A. Concrete:
 - 1. Painted surfaces – Eggshell Finish:
 - a. 1st Coat (Primer):
 - 1) Primer, alkali resistant, water-based interior/exterior.
 - a) Benjamin Moore, Ultra Spec Masonry Primer 609
 - b) Dunn-Edwards, EFF-Stop Select ESSL00.
 - c) Sherwin Williams, Loxon Primer A24W8300
 - d) PPG Paints, Perma-Crete Interior/Exterior Alkali Resistant Primer, 4-603XI
 - b. 2nd Coat:
 - 1) Exterior 100% Acrylic Eggshell
 - a) Benjamin Moore, Ultra Spec Ext Low Lustre N455
 - b) Dunn-Edwards, Spartashield SSSL30 (Gloss Level 3)
 - c) Sherwin Williams, A-100 Satin, A82-100 Series
 - d) PPG Paints, Speedhide Exterior House and Trim Satin-Acrylic Latex, 6-2045XI Series.

- c. 3rd Coat:
 - 1) Exterior 100% Acrylic Eggshell
 - a) Benjamin Moore, Ultra Spec Ext Low Lustre N455
 - b) Dunn-Edwards, Spartashield SSSL30 (Gloss Level 3)
 - c) Sherwin Williams, A-100 Satin, A82-100 Series
 - d) PPG Paints, Speedhide Exterior House and Trim Satin-Acrylic Latex, 6-2045XI Series.
- 2. Painted surfaces – Semi-Gloss Finish:
 - a. 1st Coat (Primer):
 - 1) Primer, alkali resistant, waterbased, interior/exterior.
 - a) Benjamin Moore, Ultra Spec Masonry Primer 609
 - b) Dunn-Edwards, EFF-Stop Select ESSL00.
 - c) Sherwin Williams, Loxon Primer A24W8300
 - d) PPG Paints, Perma-Crete Interior/Exterior Resistant Primer, 4-603XI.
 - b. 2nd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Ultra Spec Ext Satin N448
 - b) Dunn-Edwards, Spartashield SSSL50 (Gloss Level 5)
 - c) Sherwin Williams, A-100 Gloss
 - d) PPG Paints, Speedhide Exterior House and Trim Semi-Gloss Acrylic Latex, 6-900XI Series.
 - c. 3rd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Ultra Spec Ext Satin N448
 - b) Dunn-Edwards, Spartashield SSSL50 (Gloss Level 5)
 - c) Sherwin Williams, A-100 Gloss
 - d) PPG Paints, Speedhide Exterior House and Trim Semi-Gloss Acrylic Latex, 6-900XI Series.
- B. Concrete Block:
 - 1. Painted surfaces – Eggshell Finish:
 - a. 1st Coat (Filler):
 - 1) Latex block filler
 - a) Benjamin Moore, Ultra Spec Block Filler 244
 - b) Dunn-Edwards, Smooth BLOCFIL Premium SBSL00
 - c) Sherwin Williams, Preprite Block Filler B25W25
 - d) PPG Paints, Speedhide Interior/Exterior Masonry Hi-Fill Latex Block Filler, 6-15XI.
 - b. 2nd Coat:
 - 1) Exterior 100% Acrylic Eggshell
 - a) Benjamin Moore, Ultra Spec Ext Low Lustre N455
 - b) Dunn-Edwards, Spartashield SSSL30 (Gloss Level 3);
 - c) Sherwin Williams, A-100 Satin
 - d) PPG Paints, Speedhide Exterior House and Trim Satin-Acrylic Latex, 6-2045XI Series.
 - c. 3rd Coat:

- 1) Exterior 100% Acrylic Eggshell
 - a) Benjamin Moore, Ultra Spec Ext Low Lustre N455
 - b) Dunn-Edwards, Spartashield SSSL30 (Gloss Level 3)
 - c) Sherwin Williams, A-100 Satin
 - d) PPG Paints, Speedhide Exterior House and Trim Satin-Acrylic Latex, 6-2045XI Series.
2. Painted surfaces – Semi-Gloss Finish:
 - a. 1st Coat (Filler):
 - 1) Latex block filler
 - a) Benjamin Moore, Ultra Spec Block Filler 244
 - b) Dunn-Edwards, Smooth BLOCFIL Premium SBSL00
 - c) Sherwin Williams, Prepate Block Filler B25W25
 - d) PPG Paints, Speedhide Interior/Exterior Masonry Hi-Fill Latex Block Filler, 6-15XI.
 - b. 2nd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Ultra Spec Ext Gloss N448
 - b) Dunn-Edwards, Spartashield SSSL50 (Gloss Level 5)
 - c) Sherwin Williams, A-100 Gloss
 - d) PPG Paints, Speedhide Exterior House and Trim Semi-Gloss Acrylic Latex, 6-900XI Series.
 - c. 3rd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Ultra Spec Ext Gloss N449
 - b) Dunn-Edwards, Spartashield SSSL50 (Gloss Level 5)
 - c) Sherwin Williams, A-100 Gloss
 - d) PPG Paints, Speedhide Exterior House and Trim Semi-Gloss Acrylic Latex, 6-900XI Series.
3. Color-Stained Concrete Block:
 - a. 1st Coat:
 - 1) 5-parts Micro-Acrylic Emulsion/Siloxane (OKON tint base) to 1-part acrylic masonry paint.
 - a) Benjamin Moore, Ultra Spec Ext Flat Stain 450
 - b) Sherwin Williams, Loxon Vertical Semi-transparent Concrete Stain A31T75
 - c) PPG Paints- PERMA-CRETE® AQUA-Vertical concrete Satin (VSC) 4-51510 series.
 - b. 2nd Coat:
 - 1) 5-parts Micro-Acrylic Emulsion/Siloxane (OKON tint base) to 1-part acrylic masonry paint
 - a) Benjamin Moore, Ultra Spec Ext Flat Stain 450
 - b) Sherwin Williams, Loxon Vertical Semi-transparent Concrete Stain A31T75.
 - c) PPG Paints- PERMA-CRETE® AQUA-Vertical concrete Satin (VSC) 4-51510 series.

C. Metal Work:

1. Ferrous Metal (structural steel and uncoated ferrous metals):

a. 1st Coat (Shop Primer):

- 1) Red Oxide Alkyd Primer by Section 05 12 00, "Structural Steel Framing" or Section 05 74 00, "Ornamental Metal Work".

b. 1st Coat (Primer):

1) Rust Preventative Primer

- a) Benjamin Moore, Acrylic Metal Primer HP04
- b) Dunn-Edwards, Bloc-Rust Premium BRP00
- c) Sherwin Williams, Procryl Primer
- d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic DTM Primer, 90-1912 Series.

c. 2nd Coat:

1) Exterior 100% Acrylic Semi-Gloss

- a) Benjamin Moore, Acrylic DTM S/G HP29
- b) Dunn-Edwards Aristoshield50 ASHL50 (Gloss Level 5)
- c) Sherwin Williams, PI WB Alkyd Urethane B53
- d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.

d. 3rd Coat:

1) Exterior 100% Acrylic Semi-Gloss

- a) Benjamin Moore, Acrylic DTM S/G HP29
- b) Dunn-Edwards, Aristoshield50 ASHL50 (Gloss Level 5)
- c) Sherwin Williams, PI WB Alkyd Urethane B53
- d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.

Note: When exposed structural steel posts are connected to ornamental metal panels, the painted finish shall be per ornamental metal as listed below.

2. Ferrous Metal (Ornamental Metal, Fences, Gates, Exterior Ramps and Handrails not scheduled to be hot dipped galvanized):

a. 1st Coat (Shop Primer):

- 1) Red Oxide Alkyd Primer by Section 05 12 00, "Structural Steel Framing" or Section 05 74 00, "Ornamental Metal Work".

b. 1st Coat (Primer):

1) Rust Preventative Primer

- a) Benjamin Moore, Acrylic Metal Primer HP04
- b) Dunn-Edwards, Bloc-Rust Premium BRP00
- c) Sherwin Williams, Procryl Primer
- d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic DTM Primer, 90-1912 Series.

- c. 2nd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Corotech Acrylic DTM S/G HP29
 - b) Dunn-Edwards Aristoshield50 ASHL50 (Gloss Level 5)
 - c) Sherwin Williams, PI WB Alkyd Urethane B53
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
- d. 3rd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Ultra Spec Ext Gloss N448
 - b) Dunn-Edwards, Aristoshield50 ASHL50 (Gloss Level 5)
 - c) Sherwin Williams, PI WB Alkyd Urethane B53
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
- 3. Non-Ferrous Metals (galvanized)
 - a. 1st Coat (Primer):
 - 1) Galvanized Metal Primer
 - a) Benjamin Moore, Acrylic Metal Primer HP04
 - b) Dunn-Edwards, Ultrashield Galvanized Metal Primer ULGM00
 - c) Sherwin Williams, DTM Wash Primer B71Y1
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic DTM Primer, 90-1912 Series.
 - b. 2nd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Dunn-Edwards, Aristoshield50 ASHL50 (Gloss Level 5)
 - c) Sherwin Moore, PI WB Alkyd Urethane 53
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
 - c. 3rd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Dunn-Edwards, Aristoshield50 ASHL50 (Gloss Level 5)
 - c) Sherwin Williams, PI WB Alkyd Urethane 53
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
- 4. Non-Ferrous Metals (Aluminum and Brass):
 - a. 1st Coat (Primer):
 - 1) Galvanized Metal Primer
 - a) Benjamin Moore, Acrylic Metal Primer HP04
 - b) Dunn-Edwards, Ultrashield Galvanized Metal Primer ULGM00
 - c) Sherwin Williams, DTM Wash Primer B7141
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic DTM Primer, 90-1912 Series.

- b. 2nd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Dunn-Edwards, Aristoshield50 ASHL50 (Gloss Level 5)
 - c) Sherwin Williams, PI WB Alkyd Urethane 53
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
- c. 3rd Coat:
 - 1) Exterior 100% Acrylic Semi-Gloss
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Dunn-Edwards, Aristoshield50 ASHL50 (Gloss Level 5).
 - c) Sherwin Williams, PI WB Alkyd Urethane 53
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.
- 5. Metal Trim and Hollow Metal Doors and Frames (Acrylic DTM Option):
 - a. 1st Coat (Shop Primed):
 - 1) Galvanized per Section 08 11 00, "Hollow Metal Doors and Frames".
 - b. 2nd Coat (Shop Primed):
 - 1) Galvanize etching per Section 08 11 00, "Hollow Metal Doors and Frames".
 - c. 3rd Coat (Primer):
 - 1) Acrylic Metal Primer
 - a) Benjamin Moore, Acrylic Metal Primer HP04
 - b) Carboline, Galoseal WB Primer by Section 08 11 00, "Hollow Metal Doors and Frames".
 - c) Sherwin Williams, Procryl Primer
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.

When "Shop Primed", do not omit field applied primer prior to first coat;

 - a) Benjamin Moore, Acrylic Metal Primer HP04
 - b) Carboline Galoseal WB.
 - c) Devoe 4020PF
 - d) Onsite solvent cleaning per SSPC-SP 1 requirements.- d. 4th Coat:
 - 1) DTM Acrylic Enamel Semi-Gloss
 - a) Benjamin Moore, Acrylic DTM S/G HP29
 - b) Carboline Carbocrylic #3359 MC
 - c) Devoe, Devflex 4216L S/G
 - d) PPG Paints, Pitt-Tech Plus EP Interior/Exterior Acrylic Semi-Gloss DTM Industrial Enamel, 90-1610 Series.

6. Mechanical Equipment:

a. Duct Work and Miscellaneous Equipment:

- 1) As per Ferrous or Non-Ferrous metal listed above, as applicable.

D. Wood:

1. Painted Eggshell Finish:

a. 1st Coat (Primer):

1) Exterior Acrylic Primer

- a) Benjamin Moore, Fresh Start 046
- b) Dunn-Edwards, EZ-Prime Premium EZPR00
- c) Sherwin Williams, Exterior Latex Wood Primer B42W804
- d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.

b. 1st Coat:

1) Smooth/Rough Sawn Wood and Siding,

- a) Benjamin Moore, Fresh Start 046
- b) Dunn Edwards, EZ-Prime Premium EZPR00
- c) Sherwin Williams, Exterior Latex Wood Primer B42W804
- d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.

2) Synthetic Wood and Siding:

- a) Benjamin Moore, Fresh Start 046
- b) Dunn-Edwards, Ultra-Grip Premium UGPR00
- c) Sherwin Williams, PrepRite ProBlock B51Series
- d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.

c. 2nd Coat

1) Exterior 100% Acrylic Eggshell

- a) Benjamin Moore, Ultra Spec Ext Low Lustre N455
- b) Dunn-Edwards, Spartashield SSSL30 (Gloss Level 3)
- c) Sherwin Williams, A-100 Satin A82
- d) PPG Paints, Speedhide Exterior House and Trim Satin-Acrylic Latex, 6-2045XI Series.

d. 3rd Coat:

1) Exterior 100% Acrylic Eggshell

- a) Benjamin Moore, Ultra Spec Ext Low Lustre N455
- b) Dunn-Edwards, Spartashield SSSL30 (Gloss Level 3)
- c) Sherwin Williams, A-100 Satin A82
- d) PPG Paints, Speedhide Exterior House and Trim Satin-Acrylic Latex, 6-2045XI Series.

2. Painted Semi-Gloss Finish:

a. 1st Coat (Primer):

1) Exterior Acrylic Primer

- a) Benjamin Moore, Fresh Start 046
- b) Dunn-Edwards, EZ-Prime Premium EZPR00
- c) Sherwin Williams, Exterior Latex Wood Primer, B42W8041
- d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.

b. 1st Coat:

1) Smooth/Rough Sawn Wood and Siding,

- a) Benjamin Moore, Fresh Start 046
- b) Dunn-Edwards, EZ-Prime Premium EZPR00
- c) Sherwin Williams, Exterior Latex Wood Primer, B42W8041
- d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.

2) Synthetic Wood and Siding:

- a) Benjamin Moore, Fresh Start 046
- b) Dunn-Edwards, Ultra-Grip Premium UGPR00
- c) Sherwin Williams, Exterior Latex Wood Primer, B42W8041
- d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.

c. 2nd Coat

1) Exterior 100% Acrylic Semi-Gloss

- a) Benjamin Moore, Ultra Spec Ext Satin N448
- b) Dunn-Edwards, Spartashield SSSL30 (Gloss Level 5)
- c) Sherwin Williams, A-100 Gloss
- d) PPG Paints, Speedhide Exterior House and Trim Semi-Gloss Acrylic Latex Paint, 6-900XI Series.

d. 3rd Coat:

1) Exterior 100% Acrylic Semi-Gloss

- a) Benjamin Moore, Ultra Spec Ext Satin N448
- b) Dunn-Edwards, Spartashield SSSL30 (Gloss Level 5)
- c) Sherwin Williams, A-100 Gloss
- d) PPG Paints, Speedhide Exterior House and Trim Semi-Gloss Acrylic Latex Paint, 6-900XI Series.

3. Painted Gloss Finish:

a. 1st Coat (Primer):

1) Exterior Acrylic Primer

- a) Benjamin Moore, Fresh Start 046
- b) Dunn-Edwards, EZ-Prime Premium EZPR00
- c) Sherwin Williams, Exterior Latex Wood Primer
- d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.

- b. 1st Coat:
 - 1) Smooth/Rough Sawn Wood and Siding,
 - a) Benjamin Moore, Fresh Start 046
 - b) Dunn-Edwards. EZ-Prime Premium EZPROO
 - c) Sherwin Williams, Exterior Latex Wood Primer, B42W8041
 - d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.
 - 2) Synthetic Wood and Siding:
 - a) Benjamin Moore, Fresh Start 046
 - b) Dunn Edwards, Ultra-Grip Premium UGPR00
 - c) Sherwin Williams, Exterior Latex Wood Primer, B42W8041
 - d) PPG Paints, Sela Grip Gripper Interior/Exterior 100 Percent Acrylic Latex Primer, 17-921X1 Series.
- c. 2nd Coat
 - 1) Exterior 100% Acrylic Gloss
 - a) Benjamin Moore, Ultra Spec Ext Gloss N449
 - b) Dunn-Edwards, Spartashield SSSL60 (Gloss Level 6)
 - c) Sherwin Williams, Solo 100% Acrylic Gloss A77 Series
 - d) PPG Paints, Speedhide Interior/Exterior High Gloss Acrylic Paint, 6-8534 Series.
- d. 3rd Coat:
 - 1) Exterior 100% Acrylic Gloss
 - a) Benjamin Moore, Ultra Spec Ext Gloss N449
 - b) Dunn-Edwards, Spartashield SSSL60 (Gloss Level 6)
 - c) Sherwin Williams, Solo 100% Acrylic Gloss A77 Series
 - d) PPG Paints, Speedhide Interior/Exterior High Gloss Acrylic Paint, 6-8534 Series.
- 4. Stained Finish:
 - a. 1st Coat:
 - 1) Alkyd exterior wiping oil stain
 - a) Old Masters, Wiping Stain (one coat only)
 - b) Dunn-Edwards, Cabot Semi-Solid Acrylic Stain
 - c) Valspar, Stainseal (V-QYB)
 - d) PPG Paints, Deft Dethane Polyurethane Interior/Exterior Oil-Based 275g/L; DFT26/123/21.
 - b. 2nd Coat:
 - 1) Water-based interior wiping oil stain
 - a) Old Masters Wiping Stain
 - b) Dunn-Edwards, Cabot Semi-Solid Acrylic Stain
 - c) Valspar, Stainseal (V-QYB)
 - d) PPG Paints, Clear Deft Polyurethane Interior/Exterior Water-Based Acrylic DFT259/258/257.

- c. 3rd Coat:
 - 1) Alkyd interior wiping oil stain
 - a) Old Masters Wiping Stain
 - b) Dunn-Edwards, Cabot Semi-Solid Acrylic Stain
 - c) Valspar, Stainseal (V-QYB)
 - d) PPG Paints, Deft Dethane Polyurethane Interior/Exterior Oil-Based 275g/L; DFT26/123/21.
- E. Portland Cement Plaster:
- 1. Painted Eggshell Finish:
 - a. 1st Coat (Primer):
 - 1) Epoxy-fortified acrylic primer/sealer for interior and exterior
 - a) Benjamin Moore, Ultra Spec Masonry Primer N609
 - b) Dunn-Edwards, Eff-Stop Select ESSL00
 - c) Sherwin Williams, Loxon Primer A24W8300
 - d) PPG Paints, Perma-Crete Interior/Exterior Alkali Resistant Primer, 4-603XI.
 - b. 2nd Coat:
 - 1) Exterior 100% Acrylic Flat
 - a) Benjamin Moore, Ultra Spec Ext Flat N447
 - b) Dunn-Edwards, Spartashield SSSL10 (Gloss Level 1)
 - c) Sherwin Williams, A-100 Flat A6 Series
 - d) PPG Paints, Speedhide Exterior House Paint Flat Latex, 6-610XI Series.
 - c. 3rd Coat:
 - 1) Exterior 100% Acrylic Flat
 - a) Benjamin Moore, Ultra Spec Ext Flat N447
 - b) Dunn-Edwards, Spartashield SSSL10 (Gloss Level 1)
 - c) Sherwin Williams, A-100 Flat A6 Series
 - d) PPG Paints, Speedhide Exterior House Paint Flat Latex, 6-610XI Series.
 - 2. Painted Elastomeric Finish:
 - a. 1st Coat (Primer):
 - 1) Epoxy-fortified acrylic primer/sealer for interior and exterior
 - a) Benjamin Moore, Ultra Spec Masonry Primer 609
 - b) Dunn-Edwards, Eff-Stop Select ESSL00
 - c) Sherwin Williams, Loxon Primer A24W8300
 - d) PPG Paints, Perma-Crete Interior/Exterior Alkali Resistant Primer, 4-603XI.
 - b. 2nd Coat:
 - 1) Durable elastomeric wall coating
 - a) Benjamin Moore, Ultra Spec Elastomeric 359, 360
 - b) Dunn-Edwards, Enduralastic 5 (achieve 11-13 DFT)
 - c) Sherwin Williams, Conlex Sherlastic Elastomeric CF16 Series
 - d) PPG Paints, Perma-Crete Pitt-Flex Elastomeric Coating, 4-110XI Series.

F. Addition Work:

1. Existing Work:

a. Metal:

1) Three (3) coats as specified above.

b. Non-Metal:

1) Fill holes and cracks and apply 2 final coats as specified above.

a) Touch up primer on larger patch areas (>2 sq.in.)

G. Equipment Color Codes (unless noted otherwise in the mechanical and plumbing specifications). Color coding of equipment and piping shall follow OSHA and ANSI, and ASME A13 standards.

1. Chilled Water Systems: Piping, pumps, chillers, air separators and expansion tanks - Dark Blue.

2. Steam and Condensate: Piping, flash tanks, condensate pumps – Yellow

3. Heating Hot Water: Piping, pumps, air separator, heat exchanger, and expansion tanks - Orange.

4. Compressed Air Systems - Gray

5. Fire Protection System: Piping, valves, alarms, and drains - Safety Red

6. Natural Gas - Yellow

7. Domestic Cold Water - Dark Green

8. Domestic Hot Water - Light Green

9. Basic OSHA Guide Principles:

a. Red indicates (1) danger, (2) stop or (3) presence of fire Protect equipment.

b. Orange marks the dangerous parts of machines or energized equipment which may cut, crush, shock or injure employees. Orange emphasizes these hazards when the guards or enclosures around them are open.

c. Yellow warns of physical hazards and means caution. A striped or checkered pattern of yellow and black may be used to help attract attention.

d. Blue denotes caution and its use is restricted to marking out-of-service equipment which should not be used.

e. Green indicates either the location of safety equipment such as fire aid materials or conveys safety information.

f. Purple used for radiation hazards. It may contain a combination of purple and yellow.

g. Black & White or a combination of the two are used to designate traffic and housekeeping markings. Stripes, checkers or other variations are often used.

COLOR SCHEDULE:

PC -1 De5711 "Up North", Dunn Edwards

END OF SECTION 09 91 13

SIGNAGE
SECTION 10 14 00

PART 1 GENERAL

1.01 SUMMARY

A. Inclusions:

1. Provisions set forth in Divisions 0 and 1.
2. Signage.
 - a. Exterior building identification signs.
3. Accessories and associated hardware.
4. Submittal preparation.
5. Clean up.

B. Related Sections:

- | | |
|---------------------|----------------------------------|
| 1. Section 04 22 00 | Reinforced Concrete Unit Masonry |
| 2. Section 06 61 00 | Rough Carpentry |
| 3. Section 06 20 00 | Finish Carpentry |
| 4. Section 09 91 13 | Exterior Painting |

1.02 REFERENCES

A. American National Standards Institute (ANSI)

1. ANSI 117.1 – For Building and Facilities.

B. ASTM International (ASTM)

1. ASTM D256 – Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
2. ASTM D542 – Standard Test method for Index of Refraction of Transparent Organic Plastics.
3. ASTM D570 – Standard Test Method for Water Absorption of Plastics.
4. ASTM D638 – Standard Test Method for Tensile Properties of Plastics.
5. ASTM D695 – Standard Test Method for Compressive Properties of Rigid Plastics.
6. ASTM D696 – Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 degrees C and 30 degrees C with a Vitreous Silica Dilatometer.
7. ASTM D732 – Standard Test Method for Shear Strength of Plastics by Punch Tool.
8. ASTM D785 – Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials.
9. ASTM D790 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
10. ASTM D792 – Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.

11. ASTM D1003 – Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics.
12. ASTM D1929 – Standard Test Method for Determining Ignition Temperature of Plastics.
13. ASTM D2843 – Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.
14. ASTM D3418 – Standard Test Method for Transition Temperatures and Enthalpies of Fusion and Crystallization of Polymers by Differential Scanning Calorimetry.
15. ASTM D3763 – Standard Test Method for High-Speed Puncture Properties of Plastics Using Load and Displacement Sensors.
16. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
17. ASTM E2072 – Standard Specification for Photoluminescent (Phosphorescent) Safety Marking.
18. ASTM E2073 – Standard Test Method for Photopic Luminance of Photo Luminescent (Phosphorescent) Markings.

C. Underwriters Laboratories (UL):

1. UL 94 – Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.
2. UL 723 – Standard for Test for Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

- A. See Section 01 30 00 “Administrative Requirements” for submittal procedures.
- B. Product Data: Manufacturer’s data sheets on each product specified including:
1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.
- C. Samples or Mockups:
1. Submit one (1) sample of the manufacturer's complete color range to the Architect for color selection purposes prior to ordering material.
- D. Shop Drawings or Layout Drawings:
1. Submit copies of shop drawings to the Architect for review prior to beginning fabrication.

1.04 QUALITY ASSURANCE

- A. Regulatory Compliance:
1. All signage shall conform to 2022 CBC, Section 11B-703.

- a. Inspection: Tactile signs shall be field inspected for compliance after installation in accordance with 2022 CBC, Section 11-B.1.1.2.
- B. Manufacturer's Qualifications: Minimum two (2) years documented experience in manufacturing products specified.
- C. Installer's Qualifications: Minimum of two (2) years documented experience installing products specified.
- D. Single Source: Provide each type of specified products as produced by a single manufacturer, including necessary mounting accessories.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in unopened factory packaging.
- B. Inspect materials at delivery to verify there are no defects or damage.
- C. Store products in manufacturer's original packaging until ready for installation in climate-controlled location away from direct sunlight.
- D. Store and dispose of solvent-based materials and materials used with solvent-based materials in accordance with requirements of local authorities having jurisdiction.

1.06 PROJECT CONDITIONS

- A. Install products in an interior climate-controlled environment.
- B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside the manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Plastic Room ID, Directional and Restroom Signage:
 - 1. Mohawk Sign Systems; Schenectady, NY.
 - 2. Allenite Industries; Greensboro, NC
 - 3. Or approved equal.
- B. Individual Cast Metal Letters:
 - 1. American Sign Letters; Sebastain, FL
 - 2. Mathews Architectural Products, Pittsburgh, PA.
 - 3. Or approved equal.

2.02 MATERIALS

A. Plastic Room Identification and Directional Signage:

1. Signs shall be sand- carved 1/8" thick phenolic ES plastic laminate.
 - a. The background shall be light suede finish.
 - 1) Color as selected by Architect; Color shall be contrasting (70% minimum) to the adjacent surfaces.
 - b. Characters shall have glossy smooth finish.
 - 1) Color as selected by Architect; color shall be contrasting (70% minimum) to the sign background color.
2. Signage shall conform to California Code of Regulations, Title 24, Part 2, 2022 CBC Section 11B-703.
 - a. Characters shall be raised 1/32" minimum and shall be Sans Serif upper case characters or simple Serif type accompanied by Grade 2 Braille (see part b below).
 - 1) Character size: Raised characters shall be a minimum 5/8" and a maximum of 2 inches high.
 - 2) Finish and contrast: Characters and their background shall have a non-glare finish. Characters shall contrast with their background with either light characters on a dark background or dark characters on a light background. (CBC 11B-703.5.1).
 - 3) Proportions: Characters shall be selected from fonts where the width of the upper-case "O" is between 60% and 110% of the height of the upper-case letter "T". (CBC 11B-703.5.4). Minimum character heights shall be per CBC Table 11B-703.5.5. Character stroke thickness shall be 10% minimum and 20 % maximum of the height of the character (CBC Section 11B-703.5.7). See details on drawings for heights on room identification signs.
 - 4) Text shall also be written in California Grade No. 2 Braille per CBC Sections 703.3 & 703.4, and Table 703.3.1 and Figure 11B-703.3.1.
 - 5) Pictograms shall comply with CBC Section 11B-703.6.

B. Building Identification Signs:

1. Material:
 - a. Stainless Steel
2. Letter style:
 - a. Font: Gotham Bold
3. Letter height:
 - a. Letter height shall be as indicated on Drawings.
4. Finish:
 - a. Brushed stainless steel
5. Mounting:
 - a. Stand-off stud-type mounting. Refer to drawings for detail.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify all required backing and blocking prior to enclosing framing.
- B. Start of work shall be considered as acceptance of existing conditions.

3.02 INSTALLATION OR APPLICATION

- A. Install signage per Drawings.
 - 1. Anchorage of signs shall be set in full bed of clear silicone adhesive with tamper resistant wood screws into solid blocking, or concrete screws into block/bricks.
 - 2. Where signs are mounted on windows; signs shall be set in a full bed of clear silicone adhesive.
- B. Installation of room identification signage shall comply with accessibility guidelines per CBC Chapter 11B.
 - 1. Room identification signs shall be installed at + 60" height to the bottom of the top line of text and centered 9" from the strike of door, unless noted otherwise. Reference CBC Sec. 11B-703.4.1.

3.03 SCHEDULES

- A. Room Identification and Miscellaneous Signs:
 - 1. Refer to Signage Schedule on Drawings.
- B. Individual Letters:
 - 1. Refer to Architectural Drawings

END OF SECTION 10 14 00

**SITE SIGNAGE
SECTION 10 14 56**

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1
 - a. Site Signage
 - b. Accessories and associated hardware
 - c. Concrete footings and poles required for mounting signage
 - d. Submittal preparation
 - e. Clean up
- B. Related Sections:
 - 1. Section 32 12 16: Asphaltic Concrete Paving
 - 2. Section 32 13 13: Concrete Site Paving
 - 3. Section 32 17 00: Paving Accessories and Striping

1.02 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements: for submittal procedures.
- B. Shop Drawings or Layout Drawings:
 - 1. Submit copies of shop drawings to the Architect for review prior to beginning fabrication.

1.03 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Signs shall comply with the requirements of the California Building Code (CBC) and Division of the State Architect (DSA) Access Compliance Section.
 - 2. All pass gates with a 48" or less wide gate leaf shall comply with exit door and general door requirements and be supplied with lever hardware (landings, hardware, kick-plate, strike edge clearance, clear opening).

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Signs:
 - 1. ASI Sign Systems
 - 2. Or approved equal

2.02 MATERIALS

- A. Metal Signage:
 - 1. Use 1/16-inch-thick galvanized steel with porcelain enamel graphics and letters.
 - 2. Secure with masonry anchor screws where applicable.
- B. Mounting Post:
 - 1. 2-3/8" outside diameter schedule 40 galvanized post.
 - 2. Concrete:
 - a. By volume, one-part Type II Portland cement to 2-1/2 parts sand, to 3-1/2 parts aggregate.
 - b. Use only enough water to properly hydrate the mix and produce a maximum 4" slump.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Start of work shall be considered as acceptance of existing conditions.

3.02 INSTALLATION OR APPLICATION

- A. Install per Drawings and the manufacturer's latest written recommendations, unless shown otherwise.
- B. Mounting Post:
 - 1. Set in concrete footings as shown on the Drawings.
 - 2. Minimum footing size: 10" diameter x 24" deep, set post or sleeve 3" from bottom of footing.
 - 3. Set post in 2-1/2" nominal sleeve (2.469 inside diameter) when signage is in walk or paved areas. Sleeve shall protrude above top of concrete 1" and have 5/16" diameter galvanized tamper resistance sex bolts through pipe and sleeve. Sleeve shall be embedded in concrete to 3" from bottom of footing.
 - 4. Add post extensions to existing post where required to achieve a minimum of 6'-8" clearance to bottom of signage.
 - 5. Where existing paving is sawcut to accept footing- apply asphalt sealant in all overcuts.
 - 6. Post shall be set not more than 1/4" out of plumb over the height of the post.
- C. Concrete:
 - 1. Use only enough water to properly hydrate the mix and produce a maximum 4" slump.
 - 2. Remove loose soil from bottom of footings and tamp earth tight before pouring concrete.

3.03 SCHEDULES

A. Entry Access Signs:

1. Minimum 6"x6" International Symbol of Accessibility, white lines on blue background on 16 ga. galvanized steel.

B. Parking and Traffic Control Signs:

1. Accessible Parking Authorization Signage (Detail B1/A-501):
2. Unauthorized Vehicles towed away.
3. Accessible Parking Stall Signage (Detail D3/A-501)
4. International Symbol of Accessibility.
5. Van Accessible Sign where shown.

END OF SECTION 10 14 56

**FIRE PROTECTION SPECIALTIES
SECTION 10 44 00**

PART 1 GENERAL

1.01 SUMMARY

- A. Inclusions:
 - 1. Provisions set forth in Divisions 0 and 1.
 - 2. Fire extinguishers.
 - 3. Fire extinguisher cabinets.
 - 4. Accessories and associated hardware.
 - 5. Submittal preparation.
 - 6. Clean up.
- B. Related Sections:
 - 1. Section 06 10 00 Rough Carpentry
 - 2. Section 09 91 13 Exterior Painting

1.02 REFERENCES

- A. National Fire Protection Association (NFPA)
 - 1. NFPA 10; Standard for Portable Fire Extinguishers

1.03 SUBMITTALS

- A. See Section 01 30 00 "Administrative Requirements" for submittal procedures.
- B. Product or Material Data:
 - 1. Submit five (5) copies of product information literature to the Architect for review prior to installation.
 - a. Indicate operating features, physical size, mounting recommendations, anchorage details, and rough-in requirements.
- C. Samples or Mockups:
 - 1. Submit one (1) sample of the manufacturer's complete color range to the Architect for color selection purposes prior to ordering material.
- D. Close-Out Submittals:
 - 1. Submit three (3) copies of manufacturer's operation and maintenance information.
 - a. Include testing and recharge schedules.
 - b. Document re-certification process.
 - 2. Submit three (3) copies of certification of testing and recharge indicating that service occurred within one week of the project's final punch list.

1.04 QUALITY ASSURANCE

- A. Regulatory Compliance:
 - 1. Fire extinguisher cabinets shall be installed complying with 2022 CBC Sections 11B-309 and 11B-307 for accessibility.
 - a. Cabinets shall not protrude more than 4" from the wall.
 - b. Mount +40" max to operating mechanism or handles.
- B. Fire extinguishers shall be dry chemical type and be listed by the California State Fire Marshal (CSFM).
 - 1. Rating shall be as shown on the Fire Extinguisher Schedule at the end of this Section.

1.05 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Do not install fire extinguishers in sub-freezing temperatures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable manufacturers:
 - 1. Potter-Roemer; City of Industry, CA
 - 2. Activar Construction Group/J. L. Industries; Bloomington, MN.
 - 3. Larsen's Manufacturing Co.; Coon Rapids, MN.
 - 4. Or approved equal.

2.02 MATERIALS

- A. Fire extinguisher cabinets shall be constructed of 18-gauge minimum thickness material.
 - 1. Exterior finish shall be baked-on prime coat.
 - 2. Interior finish shall be white baked-on enamel.
 - 3. Cabinet doors shall be clear acrylic type with hollow steel frame.
 - a. Use continuous piano hinge assembly.
 - b. Door shall open 180 degrees.
 - 4. Cabinets shall have tight seams and corners.
 - 5. Cabinet, flange, and door construction shall be welded, with welds ground smooth.
 - 6. Pre-drill holes for anchorage.

2.03 ACCESSORIES OR HARDWARE

- A. Supply and install fire extinguisher wrap around wall brackets for surface-mounted extinguishers.
 - 1. Size screws for a minimum 1-1/2" penetration into stud or solid blocking.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify all required backing and blocking prior to enclosing framing.
- B. Verify rough opening sizes.
- C. Start of work shall be considered as acceptance of existing conditions.

3.02 INSTALLATION OR APPLICATION

- A. Install per the manufacturer's latest written recommendations.

3.03 CONDITION OF FINISHED WORK

- A. The completed installation shall be clean, plumb, with no visible imperfections.

3.04 SCHEDULES

- A. FIRE EXTINGUISHER SCHEDULE

TYPE	CABINET TYPE	EXTINGUISHER TYPE	
FE	Semi-recessed (#7240-DV-FP)	10#	4A:60B:C (#3010)

Note: Model Numbers shown in parentheses are Potter-Roemer indicating quality standard.

- B. Refer to drawings for type and location each fire extinguisher assembly.

END OF SECTION 10 44 00

SECTION 260000

ELECTRICAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

Work in general includes, but is not limited to, the following:

- A. Connection to existing 480 volt, 150 kva transformer.
- B. Grounding of equipment, service, etc.
- C. Complete lighting and power system as shown on Drawings and specified herein, including conduit, wiring, panelboards, circuit breakers, relays, switches, receptacles, and other items necessary for complete and operable systems.
- D. Electrical connection of equipment furnished by others as shown on the Drawings.

1.03 SITE VISITS, COORDINATION OF CONTRACT DOCUMENTS,
VERIFICATION OF DIMENSIONS

- A. Examine existing conditions as applicable. Become acquainted with Specifications and Drawings for all portions of the Project. Notify Project Manager of apparent discrepancies and of inconsistency between the Specifications and the existing conditions. Secure and follow Project Manager's instructions. The Drawings serve as working drawings only, indicating diagrammatically the general layout of the systems and their various components and equipment.
- B. Scaled and figured dimensions are approximate and are given for estimate purposes only. Carefully check and verify dimensions and sizes in order to determine if equipment and materials will fit together and if the dimensions of the assembly are compatible with the space provided. Where equipment is furnished by others, verify that dimensions and requirements for assembly are compatible with the space provided before proceeding with the roughing-in connections. Field verifications of locations shown on Drawings are necessary since actual locations, distances, mounting heights, etc., may be affected by field conditions. The right is reserved to make reasonable changes in locations of equipment or other features shown on Drawings prior to rough-in without additional cost to the Owner.
- C. Where apparatus and equipment have been indicated on the Drawings, dimensions have been taken from typical equipment of the class indicated. Carefully check the Drawings to

see that the contemplated equipment will fit into the spaces provided, regardless of whether or not it may have been approved for quality and utility as an equal.

- D. Rough in all equipment, fixtures, etc., as designated on the Drawings and as specified herein. The Drawings indicate only the approximate location of rough-ins. The exact rough-in locations must be determined from large-scale certified Drawings. The Contractor shall obtain all certified rough-in information before progressing with any Work for rough-in connections.
- E. Be responsible for providing outlets and services of proper size at the required locations.
- F. Coordinate requirements of equipment furnished by others, prior to ordering and installation.
- G. No allowance will be made for extra expense due to failure or neglect to follow foregoing directives.

1.04 RULES AND REGULATIONS

- A. Materials and installation shall be in accordance with current rules and requirements of California Code of Regulations and local codes and ordinances including, but not necessarily limited to, the current editions of the following:
 - 1. The California Electrical Code (CEC).
 - 2. Title 8, Chapter 4, California Code of Regulations (Low Voltage Electrical Safety Orders).
 - 3. California State Fire Marshal.
 - 4. California Statewide Qualified Product List (QPL), Title 20.
 - 5. Design Lights Consortium (DLC).
 - 6. NEMA (National Electrical Manufacturers Assoc.).
 - 7. IEEE (Institute of Electrical and Electronic Engineers).
 - 8. California Green Building Code.
 - 9. ANSI (American National Standards Institute).
 - 10. ASTM (American Society for Testing and Materials).
 - 11. UL (Underwriters Laboratories).
 - 12. OSHA (Occupational Safety & Health Act) Federal.
 - 13. Title 24, California Code of Regulations, California Building Code.
 - 14. NFPA (National Fire Protection Association).

15. NESC (National Electrical Safety Code).
 16. NECA Standards of Installation.
 - a. NECA/IESNA 500-2006, Standard for Installing Indoor Lighting Systems.
 - b. NECA/IESNA 501-2006 Standard for Installing Exterior Lighting Systems.
 - c. NECA 331-2018, Standard for Building and Service Entrance Grounding and Bonding
 - B. Where these Specifications call for a higher standard than the above-mentioned rules, the Specifications shall govern.
 - C. Should there be any direct conflict between the above-mentioned rules and these Specifications, the rules shall govern.
 - D. Nothing in the Drawings or Specifications is to be construed to permit Work not conforming to the rules, codes, and regulations.
 - E. All materials utilized shall be new and the best of their respective grades or kinds.
- 1.05 DEFINITIONS
- A. Article 100 of the California Electrical Code shall serve as a guide for definitions.
 - B. Industry standard definitions.
 - C. Specific Definitions:
 1. Concealed: Hidden from sight, as in trenches, chases, hollow construction, above furred spaces, suspended ceilings (acoustical or plastic type), or exposed to view only in tunnels, attics, shafts, crawl spaces, unfinished spaces, or other areas solely for maintenance and repair.
 2. Exposed: Not concealed.
 3. Unfinished Space: A room or space that is ordinarily accessible only to building maintenance personnel, a room noted on the "Finish Schedule" with exposed and unpainted construction for walls, floor or ceilings, or specifically mentioned as "unfinished".
 4. Finished Spaces: Any space ordinarily visible to the visiting public, including exterior areas.
- 1.06 RECOGNIZED TEST LAB
- A. All equipment specified or installed under this project shall be listed by a recognized test lab and bear that label of approval.

1.07 RECORD DRAWINGS

- A. Include under this Work complete and accurate record information both during construction and before final acceptance by the Owner, and costs associated therewith shall be included under this Work.
- B. Obtain from the Project Manager, at cost, a complete, full size set of prints. On these prints, systematically and accurately keep an up-to-date and legible dimensional record of Work installed differently from the location or manner indicated by the Drawings, as well as exact locations of stub-outs and hidden or underground features. Have these Drawings readily available for reference and review. When job status permits, submit them to the Project Manager and amend or correct and re-submit if requested.
- C. When the above information is complete and acceptable, deliver Record Drawings to the Project Manager.

1.08 SUBMITTALS - SUBSTITUTIONS

- A. Bids shall be based on Drawings and Specifications and references exactly as shown except as substitutions are permitted under terms of the Instructions to Bidders. Acceptance by the Project Manager of a variation or alternate shall not of itself waive other requirements of the Drawings and Specifications.
- B. Before a substitute is used, it shall be equal in quality and utility to the material or make of equipment specified, and furthermore, shall be suitable for the particular application. The decision of the Project Manager as to the quality and utility of the substitute offered shall be final.
- C. When submitting a substitute to a specified item, provide complete data for both the specified item and the substitute. Complete data includes:
 - 1. Catalog cuts with complete dimensions, characteristics, electrical properties, Underwriter's Laboratory listing, harmonics, light output, mounting and support requirements.
 - 2. Calculations, photometrics, system load data, energy effect on system, etc.

If the substitute is not deemed equal in both utility and quality to the specified item, the specified item will be approved and it shall be provided by the Contractor.
- D. Submit in one package complete systematized lists of equipment and Drawings, catalog cuts, brochures, capacity tables and curves, descriptive information, performance data and guarantees and warranties referenced either to applicable Specification paragraphs or to item numbers as shown on the Drawings, or both. Submit six (6) copies.
- E. Do not order or install equipment until submittals have been reviewed and approved.
- F. Where accepted materials or equipment other than is specified or shown on the Drawings require redesign of structural, architectural, electrical or mechanical features or layouts, such

changes shall be made by, or at the expense of the Contractor - all subject to complete review by the Project Manager.

- G. Because of the contingencies involved, review and general acceptance of proposed substitutes shall not relieve the Contractor's responsibility under this Work for ensuring in all respects the suitability of such materials and equipment for the particular Project requirements.

1.09 SHOP DRAWINGS

- A. Prepare shop Drawings of items as required by the Project Manager or by Drawings and Specifications; submit six (6) copies of each to the Project Manager as part of the submittal package, sufficiently in advance of construction, if necessary.
- B. The shop drawings shall be submitted sufficiently in advance of construction to allow time for review and for resubmission, if necessary.
- C. Submit all shop drawings and data at one time for equipment provided under this Section. The complete electrical shop drawings shall be bound in one pamphlet or binder indexed to this Section.
- D. Shop drawing submittals processed are not change orders. The purpose of shop drawing submittals by the Contractor is to demonstrate that the Contractor understands the design concept; 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. If deviations, discrepancies or conflicts between shop Drawings and Specifications are discovered, either prior to or after shop drawing submittals are processed, the design Drawings and Specifications shall control and shall be followed.
- E. Manufacturers' data and dimension sheets shall be submitted giving all pertinent physical and engineering data including weights, cross-sections and maintenance instructions. Standard items of equipment such as receptacles, switches, plates, etc., which are cataloged items, shall be listed by manufacturer.
- F. Index all submittals and reference to these Specifications.

1.10 COMPLETION DATA

- A. Submit completion data to the Project Manager in acceptable quantity and form before requesting a final inspection. Such submittal shall be corrected, amended, or completed before final acceptance of the Work.
- B. Include Record Drawings, maintenance manuals, and data; test results; control and wiring diagrams.

1.11 CUTTING, PATCHING, AND REPAIRING

- A. Cutting, patching, and framing of wood members to accommodate this Work shall be done by the Contractor and shall be in conformance with Sections 613 and 617 (F) and (K), Title

24, California Code of Regulations. All such cutting, patching and framing shall be approved by the Project Manager.

- B. Do minor miscellaneous cutting, drilling, and patching necessary and normally required at the time of actually installing this Work. Patching shall be of the same materials, workmanship, and finish as the original or surrounding Work to the complete satisfaction of the Project Manager. Comply with Division-1 CUTTING AND PATCHING Section.
- C. Adequately inform other trades of openings and framing requirements for this Work and provide suitable instructions for establishing locations and sizes of openings or sleeves so that these may be provided in the proper location at the proper time. Concrete shall not be cut, except where approved by the Project Manager.

1.12 SIMILARITY OF MATERIALS

- A. Unless specified otherwise, fixtures, fittings, hangers, and respective type features and equipment, of a similar type or having similar operative or functional features, shall be of the same manufacturer throughout the Project.

1.13 MANUFACTURERS' DIRECTIONS

- A. Follow manufacturers' directions and recommendations in all cases where the manufacturers' equipment or articles are used for this Work. Compliance with the manufacturer's direction is a requirement for that product's listing with a recognized test lab.

1.14 VERIFICATION OF DIMENSIONS

- A. Scaled and figured dimensions are approximate only. Before proceeding with Work, carefully check and verify dimensions, etc., on architectural Drawings, and be responsible for properly fitting equipment and materials together and to the structure in spaces provided.
- B. Drawings are essentially diagrammatic, and many offsets, bends, pull boxes, special fittings, and exact locations are not indicated. Carefully study Drawings and premises in order to determine best methods, exact locations, routes, building obstructions, etc., and install apparatus and equipment in available locations. Install apparatus and equipment in manner and locations to avoid obstructions, preserve headroom, and keep openings and passageways clear.

1.15 IDENTIFICATION OF EQUIPMENT

- A. All electrical equipment shall be labeled, tagged, stamped, or otherwise identified in accordance with the following schedule:
 - 1. Branch Circuit Panelboards:
 - a. Panel identification shall be P-Touch ¾" label.
 - b. Circuit directory shall be a two-column, 8-1/2 x 11" sheet attached to the inside of the door. Each odd numbered circuit shall be in sequence in the left column

and the even numbered circuit in the right column (e.g., 1, 3, 5..., 2, 4, 6...). Each circuit shall be identified as to the use and room name(s) or area(s). Confirm room names and/or room numbers with the Project Manager prior to project completion. Circuit breaker identification shall be by permanently installed metal numbers or plastic numbers under acrylic plastic. "Paste-on" numbers will not be accepted. Refer to "Panelboards" section for additional requirements.

2. Distribution Panelboards: Identification shall be with 1" x 4" laminated, white on black, micarta nameplates on each major component, each with name and/or number of unit and other pertinent data as required. Emergency power distribution panels shall be identified with white on red micarta nameplates. Letters shall be no less than 3/8" high.
3. Circuit breakers shall be identified by number and name with 3/4" x 1-1/2" laminated micarta nameplates with 3/16" high letters mounted adjacent to circuit breaker or switch.
4. Miscellaneous equipment (electrical), such as individually mounted safety switches, starters, step-down transformers, pull boxes, junction boxes, etc., shall be identified by the use of such equipment with P-Touch labels as required.
5. In general, the installed nameplates, as herein called for shall also clearly indicate its use, area served, circuit identification, voltage and any other useful data.
6. All auxiliary systems, including communications, shall be labeled to indicate function.
7. Motor control and motor control centers shall be labeled with the identification given on drawing schedules.

1.16 ARC FLASH LABELING

- A. All panels, circuit breaker enclosures, switchboards and motor control centers shall be labeled with Arc Flash Warning Stickers.

1.17 CLOSING IN OF UNREVIEWED WORK

- A. Do not allow or cause any of this Work to be covered up or enclosed until it has been reviewed by the Project Manager. Should any of this Work be enclosed or covered up before such review, uncover the Work and make repairs with such materials as may be necessary to restore the Work and that of the other trades to its original and proper condition at no additional cost to the Owner.

1.18 SAFETY PRECAUTIONS

- A. It is intended that within the scope of this Work during construction and until final acceptance, strict attention be given to matters pertaining to public safety and to safety of the construction workers and complementing personnel; and to other health and building safety requirements as specified and indicated including, but not limited to: Protection of openings in fire-rated construction; clearances from and/or protection of combustibles; proper

securement for fixtures, equipment materials; method of performing the Work, operational and safety check of electrical devices, etc.; erection and maintenance of suitable barriers, protective devices, lights and warning signs and adequate provisions for storage and protection of Work, materials and equipment.

- B. It is understood that the responsibility for the proper attention to the above stipulations is included under this Work.

1.19 WIRING OF EQUIPMENT FURNISHED UNDER OTHER SECTIONS

- A. All electrical wiring including power wiring and control wiring (except as specified under Automatic Temperature Control), including raceways, wiring, outlet and junction boxes, and labor for installation of the wiring and equipment shall be included in this section of the Specifications.
- B. All control devices, and starters not in motor control centers, for equipment furnished under the Air Conditioning section (except as specified under Automatic Temperature Control paragraph), Plumbing section, Fire Sprinkler or Lawn Sprinkler section are to be furnished under that particular section and installed under this section.
- C. Wiring diagrams complete with all connection details shall be furnished under each respective section.
- D. Coordinate requirements and locations for all equipment prior to ordering and installation.
- E. Comply with requirements of Article 430 of the California Electrical Code.

1.20 MOUNTING

- A. Provide materials and accessories necessary to properly mount and secure equipment furnished and/or installed under the electrical Work. This includes but is not limited to such items as conduit, outlets, junction boxes, switches, relays, disconnect switches, lighting fixtures, cabinets, and transformers.
- B. Inserts and Anchors shall be:
 - 1. Furnished and installed for support of Work under this Division.
 - 2. Adjustable concrete hanger inserts installed in new concrete work as manufactured by Hilti or as approved.
 - 3. Installed in locations as approved by Project Manager.
 - 4. Expandable lead type anchors installed in existing concrete with minimum surface damage, as manufactured by Hilti.
 - 5. Toggle bolts, or "molly anchors", where installed in concrete block walls.

- 6. Complete with 3/16" or heavier steel backup plate where used to support heavy items. Through-bolts or backup plate shall be concealed from view, except as otherwise indicated.
- C. Mounting of equipment that is of such size as to be freestanding and that equipment which cannot conveniently be located on walls, such as motor starters, etc., shall be rigidly supported on a framework of galvanized steel angle, Unistrut or as approved.
- D. Furnish and install sleeves for the installation of Work under all sections of this Division. Sleeves through floors, roof and walls shall be as described in conduit section.

1.21 MOUNTING HEIGHTS

- A. Receptacles shall be mounted no lower than 15" to the bottom of the device.
- B. Switches and lighting control stations shall be mounted no higher than 48" to the top of the device.
- C. Overcurrent devices and circuit breakers or disconnect switches shall be mounted no higher than 6 feet-7 inches.
- D. Refer to the Drawings for specific mounting heights.

1.22 ACCESSIBILITY

- A. Install all control devices or other specialties requiring reading, adjustment, inspection, repairs, removal or replacement conveniently and accessibly throughout the project.
- B. All required access doors or panels in walls and ceilings are to be furnished and installed as part of the Work under this Division.
- C. Provide doors which pierce a fire separation with the same fire rating as the separation.
- D. Refer to "Finish Schedule" for types of walls and ceiling in each area and architectural Drawings for rated wall construction.
- E. Coordinate Work of the various sections to locate specialties requiring accessibility with others to avoid unnecessary duplication of access doors.

1.23 FLASHING

- A. Flash and counterflash all conduits penetrating roofing membrane.

1.24 TESTS

- A. Perform electrical tests as required or directed. Provide materials, labor, and equipment necessary for performances of these tests, and at completion of the Work perform a complete "in-service" operation of the entire electrical and power system to show compliance with the Drawings and Specifications. Replace Work showing faults under tests without additional

cost to the Owner. Test system voltage at switchboards at completion of Work and provide a written report to the Project Manager.

1.25 EQUIPMENT LISTS AND MAINTENANCE MANUALS

- A. Prior to completion of job, Contractor shall compile a complete equipment list and maintenance manual. The equipment list shall include the following items for every piece of material and equipment supplied under this section of the Specifications.
 - 1. Name, model and manufacturer.
 - 2. Complete parts Drawings and list.
 - 3. Local supply for parts and replacement and telephone number.
 - 4. All tags, inspection slips, instruction packages, etc. removed from equipment as shipped from the factory, properly identified as to the piece of equipment it was taken from.
- B. Maintenance manuals shall be furnished for each applicable section of the Specifications, shall be suitably bound with hard covers, and shall include all available manufacturers' operation and maintenance instructions, together with as-built Drawings and lists hereinbefore specified and other diagrams and instructions necessary to properly operate and maintain the equipment. The equipment lists and maintenance manuals shall be submitted in duplicate to Architect for approval not less than 10 days prior to the completion of the job. The maintenance manuals shall also include the name, address and phone number of the General Contractor and all subcontractors involved in any of the Work specified herein. The maintenance manuals shall be finally provided in four copies.

1.26 CLEANING

- A. During construction on a daily basis, and upon completion of the Work, remove from the site all debris and excess materials, tools, and removed items, resulting from this Work. Clean equipment, including lighting fixtures, free of dust, dirt, grease, paint, etc.

1.27 SALVAGE

- A. Deliver salvaged equipment and material deemed salvageable by Project Manager to location designated by Project Manager. Remove other removed material and equipment from site.

1.28 GUARANTEE

- A. Leave the entire installation in complete working order, free from defects in materials, workmanship or finish. Guarantee to repair or replace parts that may develop defects due to faulty materials, equipment, or workmanship within a period of one year after the Work is accepted by the Owner. Also, guarantee to repair or replace with like materials, other existing Work in the building damaged from or during the repair of any such defective equipment, materials, or workmanship.

1.29 INSTALLERS QUALIFICATIONS

- A. Installer must have electrical certification per California Labor Code Section 3099.2.
- B. All work described in the Electrical Specifications and shown on Electrical Drawings shall be performed by California State Certified Electricians.
- C. All electrical foremen shall have a minimum of 500 hours of documented classroom training.
- D. All electrical foremen shall have a minimum of 3,000 hours of documented on-the-job training.
- E. At the time equipment submittals are made, provide copies of State Certification and training documents for electricians working on this project

PART 2 – PRODUCTS AND EXECUTION

2.01 GROUNDING

- A. Grounding shall be executed in accordance with applicable codes and regulations of the State of California, California Electrical Code and local authorities having jurisdiction as well as any additional provisions specified or shown on Drawings.
- B. Grounding bushings shall be used wherever conduits are grounded. Feeder conduits to panels and air conditioners shall have grounding bushings.
- C. Grounding conductors should be located to permit, the shortest and most direct path to ground. Connections shall be readily accessible for inspection and connections shall not be permanently concealed in floors or walls.
- D. Non-current carrying metallic parts of electrical equipment and raceways shall be securely grounded to the common system ground. In all locations, ground conductors shall be run through conduits and shall be securely bonded to the conduit at the entrance and exit. The conduit for the grounding conductors shall be continuous from the point of attachment to cabinets or equipment to the grounding electrode, and shall be securely fastened to the ground clamp fittings.
- E. Ground connections to equipment shall be made with an approved type of exothermic weld or shall be bolted or clamped to equipment or conduit. Sheet metal strap types of ground clamps shall not be used. Contact surfaces shall be thoroughly cleaned and bright before connection is made so as to ensure a good metal to metal contact.

- F. Where nonmetallic conduit is used, ground shall be achieved through use of a separate, green-insulated, copper, code-size, ground conductor included in the conduit.
- G. Bonding of cold water piping system shall be achieved at the service entrance. A copper saddle shall be installed over the copper pipe at the location of the clamp to avoid damage to the pipe.

2.02 CONDUIT

A. Rigid Steel Conduit:

- 1. Rigid steel conduit shall have zinc coated exterior, zinc or enamel interior, standard weight, zinc coated couplings, locknuts and bushings and shall bear the U.L. label. Rigid conduit shall not be installed underground.
- 2. Use rigid conduit only for exposed exterior conduit runs, wherever subject to physical damage, or where specifically called for on the Drawings or required by a serving utility.
- 3. Intermediate metallic conduit (I.M.C.) may be used in lieu of rigid steel conduit.

B. Electrical Metallic Tubing:

- 1. Electrical metallic tubing (E.M.T.) shall bear the U.L. label and shall be zinc coated thinwall conduit with zinc-coated couplings and connections. "Indent" type fittings shall not be used.
- 2. E.M.T. may be used where rigid, flexible or non-metallic conduit is not required.
- 3. E.M.T. shall be used for interior dry locations. EMT shall be used where no specified conduit type is called for on the Drawings.

C. Flexible Metallic Conduit:

- 1. Flexible metallic conduit shall be galvanized steel and bear the U.L. label. Fittings for flexible conduit shall be squeeze type. Screw-in connectors and other connectors that decrease the interior diameter of the conduit shall not be used unless specifically approved by the Project Manager.
- 2. Liquid-tight flexible conduit shall bear the U.L. label and be plastic jacketed moisture and oil resistant with oil and vapor tight connectors.

3. Use flexible conduit for final connection to equipment where vibration may injure direct conduit connection. It may be used for indoor dry locations, for fixture whips not to exceed 72 inches and in other locations where structural conditions will not permit the use of EMT not to exceed six feet, only if approved by the Project Manager.
4. Use liquid-tight flexible conduit in lieu of flexible conduit for wet, damp, or outdoor areas or where weatherproof flexible conduit is called for on the Drawings or by code.

D. Plastic Conduit:

1. Plastic conduit shall be rigid polyvinyl chloride (PVC) Underwriter's approval, Schedule 40. Connections and fittings shall be "outside" type assembled in accordance with the recommended methods of the manufacturer.
2. Underground PVC conduit shall be buried a minimum of 24 inches below grade. Where more than two conduits are installed adjacently underground, use factory made conduit spacers.
3. PVC conduit shall be used for underground conduit runs in lieu of wrapped rigid conduit except as noted otherwise on the Drawings or required by the serving utility.
4. Provide a code size ground conductor in each conduit.
5. Only braided polyethylene or similar pull rope shall be used.

E. Installation of Conduit:

1. Exposed/Concealed Conduit:
 - a. Provide secure mounting facilities for conduits. Wire or plumbers tape shall not be used for hanging conduit. Strap shall be factory made of the one hole malleable iron or two-hole galvanized clamp type.
 - b. Provide expansion couplings wherever conduits cross expansion joints.
 - c. Run conduit at right angles or parallel to structural members, walls, floors and ceilings. Where several conduits are run together or suspended, they shall be hung on Unistrut trapezes with minimum 3/8-inch rod hangers.
 - d. Cut ends of conduit square and ream to remove burrs or sharp edges. Terminate conduits properly with bushings, locknuts, etc. Terminate one (1) inch and larger conduits with insulated bushings.

- e. Render conduits projecting through the roofing watertight by proper flashings. Securely fasten a sheet metal cap and tighten band or storm collar to the conduits. Extend flashing a minimum of six (6) inches in all directions. Coordinate and install roof flashing for conduits to the satisfaction of the Project Manager.
- f. All conduit runs shall have a code size insulated grounding conductor.
- g. Pull wires shall be installed in empty conduits including telephone conduits and stub-outs, No. 12 AWG, type "THWN" insulated copper wire or 1/8-inch polyethylene rope shall be used.
- h. Flexible conduit connections shall comply with NEC Section 350-22.
- i. Provide Dura Block or similar support for roof-mounted conduits.

2.03 OUTLET, JUNCTION AND PULL BOXES

- A. Outlet boxes and junction boxes shall be galvanized one-piece pressed steel, knockout type. The size of each box shall be determined by the number of wires or conduits or size of conduits entering the box, but shall not be less than 4" square and 1-1/2" deep unless otherwise noted. All boxes shall be UL listed.
- B. Single gang outlet boxes installed in concrete or masonry walls shall be a minimum of 3-1/2" deep, 4" long and 2" wide, set flush with the wall and provided with a single gang wall plate.
- C. Install wood blocking for outlet boxes in a rigid, workmanlike manner using new material where wood studs are used. Provide rigid support to avoid twisting of outlet boxes where steel studs are used. Boxes shall be secured such that they are level and plumb.
- D. Locknuts shall be used on both sides of conduit connections to box or panel, in addition to bushing. Where a larger size opening occurs than size of conduit, use reducing washers.
- E. Exposed boxes shall be weatherproof, threaded or hub conduit with gasketed conduit cover suitable for device installed or with blank cover plate when conduit is used as a junction box. Conduit wire fill capacity shall not be exceeded.
- F. Recessed weatherproof outlets or junction boxes shall be equipped with neoprene gasketed covers.
- J. Large size junction or pull boxes shall be fabricated from code gauge sheet steel. Where located indoors, finish shall be gray enamel and covers shall be secured with screws. Where exposed to weather, they shall be weatherproof, NEMA 3R, and rain-tight and hot-dip galvanized after fabrication; also, they shall have weatherproof gaskets, flat covers and galvanized iron screws. Provide knockouts and/or threaded hubs as required for the conduit used. Boxes in finished areas shall be prime painted.
- K. Any unused, removed knockouts shall be filled with a K.O. cover.

- L. Provide bonding or grounding from metal conduit terminating in junction with concentric KO's.
- M. Install boxes and rings such that finished installation is flush with finished surface.

2.05 PLATES AND DEVICE COVERS

- A. Plates for switches, receptacles, telephone and blank outlets shall be stainless steel, Hubbell 302/304 alloy or Legrand "S" line, unless otherwise noted. Plates shall be engraved per Drawings or as covered under the Article of this Specification titled "Identification of Equipment".

2.07 RECEPTACLES

- A. Duplex convenience outlets shall be specification grade, backwire, three wire, NEMA #5-20R, self-grounding type, 20 ampere, 125 volt parallel slots, polarized, in white. Additional receptacles shall be as indicated on the Drawings. Receptacles shall be Hubbell #5253W.
- B. Receptacles indicated weatherproof shall have lift cover plates that are weatherproof "while in use" Hubbell/Taymac expandable flat ML450W or equal.
- C. Ground fault current interrupter receptacles shall be self-testing, Hubbell # GFR5352WST.
- D. Outdoor ground fault circuit interrupter receptacles shall be Hubbell #GFW RST 20W or equal.
- E. USB receptacles shall be Hubbell #USB8200W or equal.

2.08 LIGHTING SWITCHES

- A. Line voltage lighting switches shall be specification grade, quiet type, 20 amp. 120/277 volt A.C. white handled, unless otherwise noted. Switches shall be Hubbell #CS1221W.
- B. Dimmers shall be specification grade 20 amp, 120/277 volt, white. Specific attributes of dimmers: types, loads, configuration, shall be as shown on the drawings. Dimmers shall match the drivers in the light fixtures that they feed.
- C. A neutral conductor shall be routed to each switch and dimmer location.

2.07 WIRE AND CABLE

- A. 600 Volt Conductors:
 - 1. Conductors shall be copper and delivered to the site in their original, unbroken packages plainly marked or tagged with U.L. label, size, kind, insulation, name of manufacturer and trade name of the wire.

2. Type "THWN/THHN", 600-volt insulation shall be used for all locations.
3. Minimum size conductor shall be #12.
4. Conductors shall be stranded.
5. Ground conductors shall be bare copper or have green insulation.
6. 120 volt and 277 volt circuits shall have separate neutrals.

B. MC Luminary Cable:

1. MC Luminary cable may be used for line voltage and 0-10 volt wiring between light fixtures and dimmers.
2. MC Luminary cable shall be UL listed.
3. MC Luminary cable shall be properly supported along its route between fixtures and dimmers.
4. Acceptable manufacturers: Manufacturers shall be one of the following, but not limited to:
 - a. AFC
 - b. Southwire
 - c. General Cable
5. MC Cable sizes shall be as shown on the Drawings.

C. Installation:

1. Conductors shall be continuous between outlets or junction boxes and no splices shall be made except in outlet boxes, pull boxes, panelboard gutters or handholes.
2. Joints, splices and taps No. 10 or smaller (including fixture pigtails) shall be connected with "floating spring" type connectors. No. 8 and larger shall be connected with solderless connectors of 100% electrolytic copper. Split-bolt connectors are not acceptable.
3. Tighten pressure type lugs on panels and equipment, and then retighten 24 hours or more later after energizing. Provide written report of torque values on lugs.
4. Oil or grease shall not be used when pulling conductors. Use U.L. approved cable lubrication only.
5. Lace or train conductors neatly in panels, cabinets and equipment. Use plastic wire ties to route conductors at edge of enclosure away from overcurrent devices.
6. Branch circuits shall be color coded in compliance with Section 210-5 of the California Electrical Code. Colored tape is not acceptable.
7. All wiring, both line and low voltage, shall be installed in conduit unless otherwise noted.

8. Conductors from different panels or from different power sources shall not be installed in the same conduit, junction box, gutter, or raceway.

D. Tag:

1. Branch circuits shall be left tagged with circuit numbers in gutters and junction boxes where unused circuits terminate.
2. Feeder conductors shall be tagged as phase "A" or "B" or "C".
3. The method of tagging shall be with adhesive preprinted tape numbered or lettered wrap around tags. Colored tape is not acceptable.
4. Tagging shall be applied after wire is installed in conduit.
5. Feeders in panel or equipment shall be tagged by phase letter in each panel or equipment.
6. Where it is impractical to use printed markers on certain wires or cables, use blank tape with identification marked thereon with indelible pen or pencil.

- E. Color Coding for Phase Identification: Color code secondary service, feeder, and branch circuit conductors with factory applied color as follows:

<u>208y/120Volts</u>	<u>Phase</u>	<u>480y/277Volts</u>
Black	A	Yellow
Red	B	Brown
Blue	C	Orange
White	Neutral	Gray
Green	Ground	Green

2.08 DISCONNECT SWITCHES

- A. Non-fusible or fusible as shown on the Drawings, heavy duty, 250 or 600 volts as required, NEMA Type 1 enclosure, except where WP is indicated or required by code, use NEMA Type 3R enclosure.

2.09 LIGHTING FIXTURES

- A. Lighting fixtures shall be of manufacture and type as specified in the Fixture Schedule, and shall have all parts and fittings necessary to completely and properly install the fixture. Fixtures of the same type shall be of one manufacturer and of identical finish and material.
- B. Lighting fixtures shall bear Underwriter's Laboratories labels. Interior light fixtures shall be on the California Energy Commission approved list. Exterior light fixtures shall be on the DLC list.
- C. Fixtures shall be furnished and installed as indicated on the Drawings, including hangers, glassware, auxiliary equipment, drivers, adapters, connectors for continuous installation, etc.

- D. Each fixture shall be wired with conductors suitable for the voltage, current and temperature to which the conductors will be subjected.
- E. If excessive driver flicker develops within 12 months after installation, the condition shall be corrected at no charge to the Owner. Flickering of the LED or failure of an LED array within 12 months of substantial completion shall also be corrected at no charge to the Owner.
- F. Proper LEDs of type, size, color temperature and wattage indicated shall be furnished and installed in each fixture and shall be manufactured by Phillips, Sylvania, Cree, Sora or Bridgelux. The Contractor shall replace LED arrays which have been burned out prior to final completion. Clean dust, dirt, fingerprints and grease from fixtures before final completion.
- G. Install trims, reflectors, lenses and diffusers with care. Wear cloth or surgical gloves when installing these to avoid leaving fingerprints.
- H. Follow manufacturer's installation instructions when installing light fixtures.

2.10 LED LAMPS

- A. Any LED lamps used shall be JA8 compliant.
- B. LED lamps shall be UL listed.
- C. LED lamps shall be tested for use in the fixtures they will be installed in.
- D. LED lamps shall not cause fixtures to overheat or lamps to prematurely fail.

2.11 PANELBOARDS

- A. Section Includes:
 - 1. Power Distribution Panelboard: Furnish and install distribution panelboard(s) as specified herein and where shown on the associated schedules on Drawings.
 - 2. Lighting and Appliance Panelboard: Furnish and install lighting and appliance panelboard(s) as specified herein and where shown on the associated schedules on Drawings.
- B. References: The panelboard(s) and circuit breaker(s) referenced herein are designed and manufactured according to the latest revision of the following Specifications.
 - 1. NEMA PB-1 - Panelboards.
 - 2. NEMA PB-1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
 - 3. NEMA AB 1 - Molded Case Circuit Breakers.

4. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
5. UL 50 - Enclosures for Electrical Equipment.
6. UL 67 - Panelboards.
7. UL 489 - Molded-Case Circuit Breakers and Circuit Breaker Enclosures

C. Lighting and Appliance Panelboard: (Square D NQOD, no equal)

1. Interior:
 - a. Shall be rated for 240 VAC/48 VDC maximum. Continuous main current ratings, as indicated on associated schedules, not to exceed 600 amperes maximum.
 - b. Minimum short circuit current rating: As indicated on schedules in rms symmetrical amperes at 240 VAC.
 - c. Provide one (1) continuous bus bar per phase. Each bus bar shall have sequentially phased branch circuit connectors suitable for plug-on or bolt-on branch circuit breakers. The bussing shall be fully rated. Panelboard bus current ratings shall be determined by heat-rise tests conducted in accordance with UL 67. Bussing rated 100-400 amperes shall be copper. Bussing rated for 600 amperes shall be copper as standard construction. Panelboards shall be suitable for use as Service Equipment when application requirements comply with UL 67 and NEC Articles 230-F and G.
 - d. All current-carrying parts shall be insulated from ground and phase-to-phase by Noryl high dielectric strength thermoplastic or equivalent.
 - e. Split solid neutral shall be plated and located in the mains compartment up to 225 amperes so all incoming neutral cable may be of the same length.
 - f. Interior trim shall be of dead-front construction to shield user from energized parts. Dead-front trim shall have pre-formed twistouts covering unused mounting space.
 - g. Nameplates shall contain system information and catalog number or factory order number. Interior wiring diagram, neutral wiring diagram, UL Listed label and short circuit current rating shall be displayed on the interior or in a booklet format.
 - h. Interiors shall be field converted for top or bottom incoming feed. Main and sub-feed circuit breakers shall be vertically mounted. Main lug interiors up to 400

amperes shall be field convertible to main breaker. Interior leveling provisions shall be provided for flush mounted applications.

- i. Panelboard lugs shall be tightened with a torque wrench to values listed on the equipment.
 - j. Arc Flash labeling shall be provided in accordance with Section 1.18 of these specifications.
2. Main Circuit Breaker:
- a. Main circuit breakers shall have an overcenter, trip-free, toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have a permanent trip unit with thermal and magnetic trip elements in each pole. Each thermal element shall be true rms sensing and be factory calibrated to operate in a 40° C ambient environment. Thermal elements shall be ambient compensating above 40° C.
 - b. Two- and three-pole circuit breakers shall have common tripping of all poles. Circuit breakers frame sizes above 100 amperes shall have a single magnetic trip adjustment located on the front of the circuit breaker, which allows the user to simultaneously select the desired trip level of all poles. Circuit breakers shall have a push-to-trip button for maintenance and testing purposes.
 - c. Breaker handle and faceplate shall indicate rated ampacity. Standard construction circuit breakers shall be UL Listed for reverse connection without restrictive line or load markings.
 - d. Circuit breaker escutcheon shall have international I/O markings, in addition to standard ON/OFF markings. Circuit breaker handle accessories shall provide provisions for locking handle in the ON or OFF position.
 - e. Lugs shall be UL Listed to accept solid or stranded copper conductors only. Lugs shall be suitable for 90° C rated wire, sized according to the 75° C temperature rating per NEC Table 310-16. Lug body shall be bolted in place; snap-in designs are not acceptable. Lugs shall be torqued with a torque wrench to the value listed on the main circuit breaker.
3. Branch Circuit Breakers:
- a. Circuit breakers shall be UL Listed with amperage ratings, interrupting ratings, and number of poles as indicated on the panelboard schedules.
 - b. Molded case branch circuit breakers shall have bolt-on type bus connectors.
 - c. Circuit breakers shall have an overcenter toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have thermal and magnetic trip elements in each pole. Two- and three-pole circuit breakers shall have common tripping of all poles.

- d. There shall be two forms of visible trip indication. The breaker handle shall reside in a position between ON and OFF.
 - e. The exposed faceplates of all branch circuit breakers shall be flush with one another.
 - f. Lugs shall be UL Listed to accept solid or stranded copper conductors only. Lugs shall be suitable for 90° C rated wire, sized according to the 75° C temperature rating per NEC Table 310-16. Lugs shall be torqued with a torque wrench to the value listed on the main circuit breaker.
4. Enclosures:
- a. Type 1 Boxes:
 - 1) Boxes shall be galvanized steel constructed in accordance with UL 50 requirements. Galvanized steel will not be acceptable.
 - 2) Boxes shall have removable endwalls with knockouts located on one end. Boxes shall have welded interior mounting studs. Interior mounting brackets are not required.
 - 3) Box width shall be [20 in wide] [14 in wide] [8.625 in wide - NQOB column width only].
 - b. Type 1 Fronts:
 - 1) Front shall meet strength and rigidity requirements per UL 50 standards. Fronts shall have ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
 - 2) Fronts shall be hinged 1-piece with door. Mounting shall be as indicated on associated schedules.
 - c. Type 3R, 3S, 5, and 12:
 - 1) Enclosures shall be constructed in accordance with UL 50 requirements. Enclosures shall be painted with ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
 - 2) All doors shall be gasketed and equipped with a tumbler type vault lock and two (2) additional trunk type latches. All lock assemblies shall be keyed alike. Two (2) keys shall be provided with each lock. A clear plastic directory cardholder shall be mounted on the inside of door.
 - 3) Maximum enclosure dimensions shall not exceed 20 in. wide and 6.5 in. deep.

END OF SECTION