



## Technical Specifications

# County of Humboldt Probation Building Fire Reconstruction Project

PROJECT NUMBER: 170212F



June 1, 2023



**VOLUME ONE**

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NOTICE IS HEREBY GIVEN that sealed bids are invited by the Department of Public Works of Humboldt County, a public body, corporate and politic, for the performance of all the work and the furnishing of all the labor, materials, supplies, tools, and equipment for the following project:

**CONSTRUCTION OF  
HUMBOLDT COUNTY PROBATION BUILDING FIRE RECONSTRUCTION PROJECT  
COUNTY OF HUMBOLDT  
PROJECT NUMBER:170212F**

Pursuant to the Contract Documents on file with the Department of Public Works of Humboldt County.

A pre-bid meeting is scheduled for 2:00 p.m. Pacific Time, **June 28, 2023** at the Humboldt County Probation Building, 2002 Harrison Avenue, Eureka, California. Contract Documents, Plans and Specifications will be available on **June 13, 2023**.

Each Bid must be contained in a sealed envelope addressed as set forth in said Bid Documents, and filed at the office of the Clerk of the Board of Supervisors of Humboldt County, 825 5th Street, Room 111, Eureka, California at or before 2:00 P.M., Pacific Daylight Time, on **July 11, 2023**. All Bids will be publicly opened and summary amounts read aloud. The officer whose duty it is to open the Bids will decide when the specified time for the opening of Bids has arrived.

Each bid must be in accordance with the bid documents, construction drawings and specifications on file at the Humboldt County Department of Public Works, 1106 Second Street, Eureka, CA 95501. These bid documents, construction drawings and specifications are available for viewing or downloading through the Humboldt County Department of Public Works website at [humboldt.gov/bids.aspx](http://humboldt.gov/bids.aspx). Also through this website, a bidder may view and join a Document Holder's List for this work. Joining the Document Holder's List, and checking to see if there are addenda issued prior to bidding are the sole responsibility of the bidder. If any addendum is issued, the County will attempt to notify each document holder on the Document Holder's List using the email address entered onto the Document Holder's List. County shall not in any way be responsible or liable for failure of a document holder to receive notification. **It is the bidder's responsibility, prior to submitting the bid, to check the website or otherwise inquire to determine whether the County has issued any Addenda.**

Each Bid shall be submitted on the forms furnished by the County within the Bid Documents. All forms must be completed.

Each Bid shall be accompanied by one of the following forms of Bidder's Security to with a certified check or a cashier's check payable to the County, U.S. Government Bonds, or a Bid Bond executed by an admitted insurer authorized to issue surety bonds in the State of California (in the form set forth in said Contract Documents). The Bidder's security shall be in the amount equal to at least ten percent (10%) of the Bid.

The successful Bidder will be required to furnish and pay for a satisfactory faithful performance bond and a satisfactory payment bond in the forms set forth in said Bid Documents.

The County reserves the right to reject any or all Bids or to waive any informalities in any Bid. No Bid shall be withdrawn for a period of one-hundred (100) calendar days subsequent to the opening of Bids without the consent of the County.

All Bidders will be required to certify that they are eligible to submit a Bid on this project and that they are not listed either (1) on the Controller General's List of Ineligible Bidders/Contractors, or (2) on the debarred list of the Labor Commissioner of the State of California.

The successful Bidder shall possess a valid Contractor's license in good standing, with a classification of "B" (General Building Contractor) at the time the contract is awarded.

The successful Bidder will be required to comply with all equal employment opportunity laws and regulations both at the time of award and throughout the duration of the Project.

This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. Pursuant to Section 1771.1(a) of the California Labor Code, a contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code, or engage in the performance of any contract for public work, as defined in Sections 1770 et seq. of the Labor Code, unless currently registered and qualified to perform public work pursuant to Section 1725.5 of the Labor Code. It is not a violation of Section 1771.1(a) for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded.

The Contractor, and each subcontractor participating in the Project, shall be required to pay the prevailing wages as established by the Department of Industrial Relations, Division of Labor Statistics and Research, P.O. Box 420603, San Francisco, CA, Phone: (415) 703-4780.

The attention of Bidders is directed to the fact that the work proposed herein to be done will be financed in whole or in part with State and County funds, and therefore all of the applicable State and County statutes, rulings and regulations will apply to such work.

In the performance of this contract, the Contractor will not discriminate against any employee or applicant for employment in accordance with the provisions of the California Fair Employment and Housing Act. (Government Code section 12900et seq.)

In accordance with the provisions of Section 22300 of the Public contractors' code, the Contractor may elect to receive 100% of payments due under the contract from time to time, without retention of any portion of the payment, by entering into an Escrow Agreement for Security Deposits In Lieu of Retention.

DATED: \_\_\_\_\_

ATTEST: \_\_\_\_\_

By: \_\_\_\_\_

Kathy Hayes  
Clerk of the Board of Supervisors,  
County of Humboldt, State of California

**END OF SECTION**

Sealed Bids will be received by the Clerk of the Board of Supervisors of the County of Humboldt, Humboldt County Courthouse, 825 5th Street, Room 111, Eureka, California 95501, until 2:00 p.m. Pacific Time, on **July 11, 2023** at which time they will be publicly opened by the Clerk of the Board of the County of Humboldt at a public meeting in the Office of the Clerk of the Board, for performance of the following work:

CONSTRUCTION OF  
HUMBOLDT COUNTY PROBATION BUILDING FIRE RECONSTRUCTION  
PROJECT NUMBER: 170212F

**1.1 SECURING DOCUMENTS:**

Each bid must be in accordance with the bid documents, construction drawings and specifications on file at the Humboldt County Department of Public Works, 1106 Second Street, Eureka, CA 95501. These bid documents, construction drawings and specifications are available for viewing or downloading through the Humboldt County Department of Public Works website at [humboldt.gov/bids.aspx](http://humboldt.gov/bids.aspx). Also through this website, a bidder may view and join a Document Holder's List for this work. Joining the Document Holder's List, and checking to see if there are addenda issued prior to bidding are the sole responsibility of the bidder. If any addendum is issued, the County will attempt to notify each document holder on the Document Holder's List using the email address entered onto the Document Holder's List. County shall not in any way be responsible or liable for failure of a document holder to receive notification. **It is the bidder's responsibility, prior to submitting the bid, to check the website or otherwise inquire to determine whether the County has issued any Addenda.**

**1.2 BASIC INFORMATION:**

These instructions pertain to the work (as hereinafter defined) to be performed under Agreement with the County of Humboldt (hereinafter sometimes called "Owner"):

Owner Humboldt County Board of Supervisors  
825 Fifth Street  
Eureka, CA 95501

Owner's Lead Agency: Department of Public Works  
County of Humboldt  
1106 Second Street  
Eureka, CA 95501  
Phone: (707) 445-7493  
Fax: 445-7409

Project Location: Humboldt County Probation Building  
2002 Harrison Avenue  
Eureka, CA 95501  
Humboldt County, CA

Architect: Nichols, Melburg & Rossetto  
300 Knollcrest Drive  
Redding, California 96002  
Phone: (530) 222-3300

- 1.3 RECEIPT OF BIDS:** Each bidder should mark its bid as "Bid for the Construction of Humboldt County Probation Building Fire Reconstruction." Bids shall be deemed to include the written responses to the bidder to any questions or requests for information of County made as part of bid evaluation process after submission of bid. Telephone and telefax proposals will not be accepted. County will reject all bids received after the specified time and will return such bids to

bidders unopened.

**1.4 DETERMINATION OF APPARENT LOW BIDDER:** Apparent low bid will be based on the amount of the bids listed of the Bid Form with the following criteria:

A. The apparent low bid will be based on the Base Bid.

**1.5 REQUIRED BID FORM:** All bidders must submit bids on the Section 00 41 00, the "Bid Form." County will reject as non-responsive any bid not submitted on the required form. Bids must be full and complete. Bidders must complete all bid items and supply all information required by the bidding documents and specifications. County reserves the right in its sole discretion to reject any bid as non-responsive as a result of any error or omission in the bid. Bidders may not modify the Bid Form or qualify their bids. Bidders must submit clearly and distinctly written bids. Bidders must clearly make any changes in their bids by crossing out original entries, entering new entries and initialing new entries. County reserves the right to reject any bid not clearly written. The Bid Form shall be signed by the bidder's legal representative as indicated on the Bid Form. If the bid is made by an individual, it shall be signed and his/her full name and his/her address shall be given; if it is made by a partnership, it shall be signed with the co-partnership name by a member of the firm, who shall sign his/her own name and provide the name and address of each member; and if it is by a corporation, the bid shall show the name of the corporation and the state under the laws of which the corporation was chartered. When the bid is signed by the duly authorized officer or officers of the corporation, it shall be attested by the corporate seal, and the names and titles of the principal officers of the corporation shall be given. When a bid is signed by an agent, other than the officer or officers of a corporation authorized to sign contracts on its behalf or a member of a partnership, a "Power of Attorney" must be filed with the County prior to opening bids or shall be submitted with the bid; otherwise, the bid may be rejected as irregular and unauthorized. Bids submitted as joint ventures must so state and be signed by each venturer.

**1.6 CONTENTS OF BID ENVELOPE:** The bid envelope shall contain all of the following:

- A. Section 00 41 00 - Bid Form
- B. Section 00 43 13 - Bid Security Form (Bid Bond)
- C. Section 00 43 36 - Subcontractor List
- D. Section 00 45 13 – Bidder's Qualifications
- E. Section 00 45 19 - Non-collusion Affidavit
- F. Section 00 45 26 - Workers' Compensation Certification
- G. Section 00 45 50 - Debarment and Suspension Certification
- H. Section 00 46 00 - Public Contract Code 10232 Statement

**1.7 BID OPENING:** The County will stamp bids with the date and time of receipt. Bids will be opened and read publicly at the time and place indicated in Section 1 above. Bidders or their authorized agents may be present. After opening of bids, the County will review all bids for accuracy and reserves the right to correct obvious errors. Upon completion of review, the bids will be ranked by the bid amount as noted in section 1.4 above, and the apparent low bidder will be determined and notified.

**1.8 FAILURE TO EXECUTE AND DELIVER DOCUMENTS:** IF the bidder to whom the Contract is awarded shall fail or neglect , with ten (10) calendar days from the date of the receipt of a notice



of award, to execute and deliver all required Contract Documents and file all required bonds, insurance certificates and other documents, County may, in its sole discretion, deposit bidder's surety bond, cashier's check or certified check for collection, and retain the proceeds thereof as liquidated damages for bidder's failure to enter into the Contract Documents. Bidder agrees that calculating the damages County may suffer as a result of bidder's failure to execute and deliver all required Contract Documents would be extremely difficult and impractical and that the amount of bidder's required bid security shall be the agreed and presumed amount of County's damages.

- 1.9 BIDDER'S BOND, PERFORMANCE BOND AND PAYMENT BOND:** Bid security must be submitted with the bid. The successful bidder, prior to execution of the Contract, must submit a Performance Bond in the full amount of the Contract. The successful bidder, prior to execution of the Contract, must submit a Payment Bond in the full amount of the Contract.
- A. The company providing the required performance and payment bonds must be listed in U.S. Treasury Circular No. 570 as a surety approved to issue bonds securing Government contracts in the State of California
- 1.10 REQUIRED LISTING OF PROPOSED SUBCONTRACTORS:** Each bid shall have listed therein the name, address, description of work, contractor's license number and DIR Registration Number of each subcontractor to whom the bidder proposes to subcontract portions of the work in the amount of 1/2 of one percent of their total bid, in accordance with the Subletting and Subcontracting Fair Practices Act, commencing with Section 4100 of the Public Contract Code and for verification of conformance with Labor Code Sections 1771 and 1725.5. The bidder's attention is invited to other provisions of said Act related to the imposition of penalties for a failure to observe its provisions by using unauthorized subcontractors or by making unauthorized substitutions.
- A. A sheet for listing the subcontractors, as required herein, is included in the specifications. Please reference Section 00 43 36 "Subcontractor List."
- 1.11 INSURANCE:** It is highly recommended that bidders confer with their respective insurance carriers or brokers to determine in advance of bid submission the availability of the insurance certificates and endorsements required. A bidder, who executes the Contract and thereafter fails to comply strictly with the insurance requirements, will be deemed to be in breach of Contract.
- 1.12 RESERVATION OF RIGHTS:** County specifically reserves the right, in its sole discretion, to reject any or all bids, or re-bid, or to waive minor irregularities from bid requirements. If no bids are received, the County reserves the right to identify interested contractor(s) and negotiate directly without re-bidding.
- 1.13 SECURITIES IN LIEU OF RETENTION:** Public Contract Code Section 22300 gives the Contractor for option to deposit securities with an escrow agent as a substitute for retention earnings to be withheld by the County.
- 1.14 PRE-BID MEETING:** The Pre-Bid Meeting is scheduled for 2:00 p.m. Pacific Time, June 28, 2023 at the Humboldt County Probation Building, Main Entrance, 2002 Harrison Avenue, Eureka California.
- 1.15 WITHDRAWAL OF BIDS:** Any bidder may withdraw his/her bid, either personally or by written request, any time prior to the scheduled closing time for receipt of bids.
- 1.16 QUESTIONS AND CLARIFICATIONS:** In order to avoid any misinterpretation or misrepresentation between the Bidder, the Architect and the County as regards the plans and specifications for the Project, neither the County nor Architect will respond to any verbal or telephone inquiries, however Bidders may submit written inquiries for clarifications or questions

by email or mail to the attention of Department of Public Works, 1106 Second Street, Eureka, CA 95501,, Email: [capitalprojects@co.humboldt.ca.us](mailto:capitalprojects@co.humboldt.ca.us) . Any responses to written Bidder inquiries will be at the full discretion of the County, and any responses will be in writing in the form of an Addendum to these Contract Documents, which will be sent to all Bidders.

**1.17 MINIMUM RATES OF PAY:** Contractor, and each subcontractor participating in the Project, shall be required to pay the prevailing wages as established by the Department of Industrial Relations, Division of Labor Statistics and Research, P.O. Box 420603, San Francisco, CA, Phone: (415) 703-4780. A schedule of the minimum rates of pay applicable to this Contract may be determined through the Department of Industrial Relations website at: <https://www.dir.ca.gov/OPRL/DPreWageDetermination.htm> or is on file at the principal office of Humboldt County Public Works at 1106 Second Street, Eureka, California, and shall be made available to any interested party on request.

**1.18 COMMUNICATIONS:**

- A. All notices, demands, requests, instructions, approvals, proposals, and claims must be in writing.
- B. Any notice to or demand upon the Contractor shall be sufficiently given if delivered at the office of the Contractor stated on the signature page of the Contract or at such other office as Contractor may from time to time designate in writing to the County of Humboldt or deposited in the United States mail in a sealed postage-prepaid envelope, or if delivered with charges prepaid to any delivery company for transmission, in each case addressed to such office.
- C. All papers required to be delivered to the County shall, unless otherwise specified in writing to the Contractor, be delivered to the County and any notice to or demand upon the County of Humboldt shall be mailed in a sealed, postage-prepaid envelope, or delivered with charges prepaid to any delivery company for transmission to the County of Humboldt at such address, or to such other representatives of the County of Humboldt or to such other address as the County may subsequently specify in writing to the Contractor for such purpose.
- D. Any such notice shall be deemed to have been given as of the time of actual delivery; or, in the case of mailing, when the same should have been received in due course of post; or, in case of any delivery company, at the time of actual receipt.

**1.19 SUBSTITUTIONS:**

- A. All pre-bid procurement substitution requests for "equal" products or systems shall be submitted to the Owners Representative 10 days prior to the contract bid opening date. All pre-bid substitution requests shall be submitted on the procurement substitution form, see Section 00 26 00.
- B. Product substitution requests for products that are "equal" to specified products but not produced by an "Acceptable Manufacturer", per each technical specification shall be submitted within 35 days after the contract is awarded. All product substitution requests shall be submitted on the PRODUCT SUBSTITUTION REQUEST FORM; see Section 01 60 00, "Product Requirements."

**1.20 ADDENDA OR BULLETINS:** Any Addenda or Bulletins issued during the time of bidding or forming a part of the Documents loaned to the Bidder, for the preparation of his Bid, shall be covered in the Bid, and shall be made a part of the Contract.

**1.21 BIDDERS INTERESTED IN MORE THAN ONE BID:** No person, firm, or corporation shall be allowed to make or file, or be interested in more than one bid for the same work, unless alternate bids are called for. A person, firm, or corporation, who has submitted a sub-proposal to a bidder, is not thereby disqualified from submitting a sub-proposal or quoting prices to the other bidders.

**1.22 VISITING THE SITE & KNOWLEDGE OF PLANS & SPECIFICATIONS:** Before submitting a bid for the work, it is recommended that the Bidder inspect the sites and inform himself as to the

conditions under which he will be obligated to execute the work. A Pre-Bid meeting and walk-through are scheduled for this project. See Paragraph 1.13 above.

No allowance will be subsequently made for failure to inspect, and the Bidder will be solely responsible for the consequences of his negligence or lack of diligence. Before submitting any proposal, each Bidder shall examine the General Conditions, Plans, Specifications, as well as these Instructions to Bidders, and the forms appended hereto and made a part hereof.

**1.23 BID PROTEST:** Any bid protest must be in writing and must be received by the Director of Public Works, Humboldt County Department of Public Works, 1106 Second Street, Eureka, CA, 95501, Fax: (707) 445-7409 or by email before 5:00 p.m. no later than three (3) working days following bid opening (the "Bid Protest Deadline") and must comply with the following requirements:

- A. Only a bidder who has actually submitted a Bid Proposal is eligible to submit a bid protest against another bidder. Subcontractors are not eligible to submit bid protests. A bidder may not rely on the bid protest submitted by another bidder, but must timely pursue its own protest.
- B. The bid protest must contain a complete statement of the basis for the protest and all supporting documentation. Material submitted after the Bid Protest Deadline will not be considered. The protest must refer to the specific portion or portions of the Contract Documents upon which the protest is based. The protest must include the name, address and telephone number of the person representing the protesting bidder if different from the protesting bidder.
- C. A copy of the protest and all supporting documents must also be transmitted by fax or by e-mail, by or before the Bid Protest Deadline, to the protested bidder and any other bidder who has a reasonable prospect of receiving an award depending upon the outcome of the protest.
- D. The protested bidder may submit a written response to the protest, provided the response is received by the Department Director before 5:00 p.m., within two (2) working days after the Bid Protest Deadline or after receipt of the bid protest, whichever is sooner (the "Response Deadline"). The response must include all supporting documentation. Material submitted after the Response Deadline will not be considered. The response must include the name, address and telephone number of the person representing the protested bidder if different from the protested bidder.
- E. The procedure and time limits set forth in this section are mandatory and are the bidder's sole and exclusive remedy in the event of bid protest. The bidder's failure to comply with these procedures shall constitute a waiver of any right to further pursue a bid protest, including filing a Government Code Claim or initiation of legal proceedings.

**END OF SECTION**

1. PROJECT DESCRIPTION

Construction of Humboldt County Probation Building Fire Reconstruction Project.

A. Project Location:  
Humboldt County Probation Building  
2002 Harrison Avenue  
Eureka, CA 95501

2. TIME FOR COMPLETION

The Contractor shall complete the entire project within **120** calendar days from the County's issuance of the "Notice to Proceed".

3. LIQUIDATED DAMAGES

It is understood and agreed that in case all of said work is not complete within the Agreement time, damages will be sustained by the Owner, and that it is and will be impractical or extremely difficult to determine the actual damages which the Owner will sustain in the event and by reason of such delay; and it is therefore agreed that the Contractor will pay to the Owner the sum of one thousand dollars (\$1,000) per day for each and every day's delay beyond the Agreement time specified as liquidated damages and in case the same are not paid, agrees that the Owner may deduct the amount therefrom any money due or that may become due the Contractor under this contract.

4. JOB OFFICES

A. The Contractor must designate an area to serve the posting requirements of this contract. A board (4' x 8') must be in plain view in a well-trafficked area on site. On this board will be posted EEO and wage information in compliance with the General Conditions of this contract.

B. The Contractor and their subcontractors may maintain such office and storage facilities on the site as may be necessary for the proper conduct of the work. These shall be located so as to cause no interference with any work to be performed on the site. The Owner's Representative shall be consulted with regard to locations.

C. Upon completion of the project, or as directed by the County of Humboldt, Owner's Representative, the Contractor shall remove all such temporary structures and facilities from the site, same to become their property, and leave the premises in the condition required by the County.

D. The Contractor shall furnish and maintain, during construction of the project, adequate facilities at the site to be designated by the County of Humboldt for the use of the County of Humboldt and the Architect. Refer to Section 01 50 00.

5. NOISE ABATEMENT PROVISIONS

A. Noise Affecting Sites and Adjacent Neighborhoods:

1. Limit noise and vibration to a reasonable level as related to specific items of equipment used and their hours of use and as indicated herein. This does not preclude use of mechanical equipment, i.e. jack hammers or power driven fasteners.
2. Comply with all local noise ordinances.
3. The Owner's Representative and the Owner shall be the sole judges of permissible noise and vibration levels and they have the right to designate times when they may be used. Comply also with requirements of Section 01 11 00 – Summary Of Work.

- B. External Noise:
  - 1. Locate stationary noise sources away from noise sensitive land uses and buildings to the extent possible. Obtain approval from the Owner's Representative before locating stationary noise sources.
  - 2. Use truck haul routes through surrounding communities which minimize impacts on noise sensitive land uses. On the site, use routes as directed and approved by Owner's Representative.
- C. Vibration Control: Provide ten (10) working days notice before conducting construction activities that might cause vibration, such as, but not limited to, drilling, excavation, compaction, pile driving, etc.
- D. Noise Levels: Do not exceed an average continuous sound level of 72 dBA, measured at the perimeter of the work area, and do not exceed an impact noise level of 100 dBA measured at the perimeter of the work area, and only two impact occurrences between 72 dBA and 100 dBA are permitted in a one-hour period.

**END OF SECTION**

**Project Name:** Humboldt County Probation Building Fire Reconstruction Project    **Date:** \_\_\_\_\_

**Project Number:** 170212F

Note to Contractor: All pre-bid substitution requests for "equal" products or systems shall be submitted to the Owner's Representative, ten (10) days prior to the contract bid date. Refer to specification Section 00 21 13 INSTRUCTIONS TO BIDDERS, section 1.19 "Substitutions." See Section 01 60 00 "PRODUCT REQUIREMENTS" for substitution request during construction.

We hereby submit for your consideration the following product in lieu of the specified item for the above project.

SECTION: \_\_\_\_\_ Paragraph: \_\_\_\_\_

Specified Item: \_\_\_\_\_

Proposed Substitution: \_\_\_\_\_

1. Attach completed technical data, including laboratory tests, color and material samples, if applicable
2. Include complete information on changes to Drawings and/or Specifications which proposed substitution will require for its proper installation. (Plan layout changes, electrical hookup locations)
3. Does the substitution affect dimensions shown on Drawings?             Yes             No
4. Will the undersigned pay for changes to the building design, including detailing costs caused by the requested substitution?     Yes             No
5. What effect does substitution have on other trades?
6. Differences between proposed substitution and specified item?
7. Cost of proposed substitution in comparison with product, system, or method specified?
8. Availability of maintenance and repair services, and sources of repair or replacement items?
9. Manufacturer's guarantees of the proposed and specified items are:  
 Same             Different (Explain on attachment)

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

Submitted By: \_\_\_\_\_

Signature: \_\_\_\_\_

Firm: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

FOR USE BY ARCHITECT:

Accepted                       Accepted as Noted\_

Not Accepted                       Received Too Late\_

By:                                      Date:

Remarks: \_\_\_\_\_

**END OF SECTION**

**KNOW ALL MEN BY THESE PRESENTS:**

That \_\_\_\_\_ as Principal and \_\_\_\_\_ a corporation, organized and existing under and by virtue of the laws of the State of \_\_\_\_\_ and authorized to do surety business in the State of California, as Surety, are held and firmly bound unto the County of Humboldt, State of California, as Obligee, in the sum of \_\_\_\_\_, Dollars (\$ \_\_\_\_\_), for the payment of which sum well and truly to be made, we, and each of us, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has submitted a bid to the County of Humboldt, State of California, for all work specifically described in the accompanying bid;

NOW, THEREFORE, if the aforesaid Principal is awarded the contract, and within the time and manner required under the specifications, after the prescribed forms are presented to Principal for signature, enters into a written contract in the prescribed form, in accordance with the bid, and files the two bonds, one guaranteeing faithful performance and the other guaranteeing payment for labor and materials as required by law, or if the said Principal shall fully reimburse and save harmless the Obligee from any damage sustained by the Obligee through failure of the Principal to enter into the written contract and to file the required performance and labor and material bonds, then this obligation shall be null and void; otherwise, it shall be and remain in full force and effect.

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

IN WITNESS WHEREOF, we have hereunto set our hands and seals this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_.

By: \_\_\_\_\_  
Principal (Seal) Surety (Seal)

- NOTE: (1) Signature of those executing for the surety must be properly acknowledged.  
(2) This bond must be in an amount equal to as least ten (10%) percent of the amount bid.  
(3) Bidders must use this form unless the surety company form is substantially the same.

**END OF SECTION**







### 1.1 DETERMINATION OF BIDDER RESPONSIBILITY

- A. A responsible bidder is a bidder who has demonstrated the attribute of trustworthiness, as well as quality, fitness, capacity and experience to satisfactorily perform the contract. It is the County's policy to conduct business only with responsible contractors. (Ord. 2291, § 1, 01/07/2003)
- B. Bidders are hereby notified that the County may determine whether the bidder is responsible based on a review of the bidder's performance on any contracts, including but not limited to County contracts. Particular attention will be given to violations of labor laws related to employee compensation and benefits, and evidence of false claims made by the bidder against public entities. This will include subcontractors and their employees as well. (Ord. 2291, § 1, 01/07/2003)
- C. The County may declare a bidder to be non-responsible for the purpose of this contract, if the Board of Supervisors, in its discretion, finds that the bidder has done any of the following: (1) committed any act or omission which negatively reflects on the bidder's quality, fitness or capacity to perform this contract with the County or a contract with any other public entity, or engaged in a pattern or practice which negatively reflects on same; (2) committed an act or omission which indicates a lack of business integrity or business honesty; or (3) made or submitted a false claim against the County or any other public entity. (Ord. 2291, § 1, 01/07/2003)
- D. If there is evidence that the apparent low bidder may not be responsible, the department shall notify the bidder in writing of the evidence relating to the bidder's responsibility, and its intention to recommend to the Board of Supervisors that the bidder be found not responsible. The department shall provide the bidder and/or the bidder's representative with an opportunity to present evidence as to why the bidder should be found to be responsible and to rebut evidence which is the basis for the department's recommendation. If the bidder fails to avail itself of the opportunity to rebut the department's evidence, the bidder may be deemed to have waived all rights of appeal. (Ord. 2291, § 1, 01/07/2003)
- E. If the bidder presents evidence in rebuttal to the department, the department shall evaluate the merits of such evidence, and based on that evaluation, make a recommendation to the Board of Supervisors. The final decision concerning the responsibility of the bidder shall reside with the Board of Supervisors. (Ord. 2291, § 1, 01/07/2003)
- F. These terms shall also apply to proposed [subcontracts/ sub-consultants] of bidders on County contracts. (Ord. 2291, § 1, 01/07/2003)

### 1.2 DETERMINATION OF BIDDER DEBARMENT

- A. The bidder is hereby notified that the County may debar the bidder from bidding on other County contracts for a specified period of time, not to exceed three (3) years, and the County may terminate any or all of the bidder's existing contracts with the County, if the Board of Supervisors finds, in its discretion, that the bidder has done any of the following: (1) violated any term of a contract with the County; (2) committed any act or omission which negatively reflects on the bidder's quality, fitness, or capacity to perform a contract with the County or any other public entity, or engaged in a pattern or practice which negatively reflects on same; (3) committed an act or offense which indicates a lack of business integrity or business honesty; or (4) made or submitted a false claim against the County or any other public entity. (Ord. 2291, § 1, 01/07/2003)
- B. If there is evidence that the apparent low bidder may be subject to debarment, the

department shall notify the bidder in writing of the evidence which is the basis for the proposed debarment, and shall advise the bidder of the scheduled date for a debarment hearing before the Contractor Hearing Board (CHB). (Ord. 2291, § 1, 01/07/2003)

- C. The CHB shall conduct a hearing where evidence on the proposed debarment is presented. The bidder and/or the bidder's representative shall be given an opportunity to submit evidence at that hearing. After the hearing, the CHB shall prepare a proposed decision, which shall contain a recommendation regarding whether the bidder should be debarred, and, if so, the appropriate length of time of the debarment. If the bidder fails to avail itself of the opportunity to submit evidence to the CHB, the bidder may be deemed to have waived all rights of appeal. (Ord. 2291, § 1, 01/07/2003)
- D. A record of the hearing, the proposed decision and any other recommendation of the CHB shall be presented to the Board of Supervisors, by the department head. The Board of Supervisors shall have the right to modify, deny or adopt the proposed decision and recommendation of the hearing board. (Ord. 2291, § 1, 01/07/2003)
- E. These terms shall also apply to proposed [subcontractors/ sub-consultants] of bidder's on County contracts. (Ord. 2291, § 1, 01/07/2003)

**1.3 EVIDENCE OF RESPONSIBILITY / NONRESPONSIBILITY**

(Humboldt County Code Sections 2141 et seq.)

The bidder shall, under penalty of perjury, answer each of the questions below and provide supporting documentation. The term "bidder" shall include any person associated with the bidder in the capacity of owner, partner, director, officer or manager.

- 1. Is the bidder under suspension, debarment, or determination of ineligibility by any federal, state or local agency?  No  Yes (explain)
  
- 2. Has the bidder been suspended, debarred, or determined ineligible by any federal, state or local agency within the preceding 5 years:  No  Yes (explain)
  
- 3. Is there pending against the bidder any proposed debarment or suspension proceeding?  No  Yes (explain)
  
- 4. Has the bidder been indicted, charged with, or convicted, or assessed civil or administrative penalties, or had a civil judgment rendered against it, in any matter involving:

- (a) fraud, false claims, or dishonesty;
- (b) any serious or wilful violation of the California Occupational Safety and Health Act of 1973 (Labor Code Sections 6300 et seq) or the Federal Occupational Safety and Health Act of 1970;
- (c) violation of the state workers' compensation laws;
- (d) violation of the Contractor's State License Law (Bus & Prof Code Sections 7000 et seq.)
- (e) violation of prevailing wage laws;
- (f) violation of state or federal environmental laws;
- (g) violation of local laws related to permits, land use, or waste disposal?

**[ ] No [ ] Yes (explain)**

5. Has the bidder defaulted on a construction contract within the preceding 10 years?

**[ ] No [ ] Yes (explain)**

6. Provide information concerning any bankruptcy or receivership of bidder, and information regarding all legal claims, disputes, or lawsuits (including administrative matters) arising from any construction project performed within the preceding 5 years, including information regarding any work completed by a surety.

NOTE: This information will not necessarily result in denial of award, but will be considered in determining bidder responsibility. Bidders are cautioned that making a false certification may subject the bidder to criminal prosecution.

Signature of Bidder: \_\_\_\_\_

Printed Name: \_\_\_\_\_

Date: \_\_\_\_\_

**END OF SECTION**

**TO THE COUNTY OF HUMBOLDT, DEPARTMENT OF PUBLIC WORKS:**

Non-Collusion Affidavit

(Title 23 United States Code Section 112 and Public Contract Code Section 7106)

In accordance with Title 23 United States Code Section 112 and Public Contract Code 7106 the Bidder declares that the Bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the Bid is genuine and not collusive or sham; that the Bidder has not directly or indirectly induced or solicited any other Bidder to put in a false or sham bid, and they have not directly or indirectly colluded, conspired, connived, or agreed with any Bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the Bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the Bidder or any other Bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other Bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and further, that the Bidder has not directly or indirectly, submitted their bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member of agent thereof to effectuate a collusive or sham bid.

\_\_\_\_\_  
Signature of Bidder

\_\_\_\_\_  
Date

Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

**END OF SECTION**

**Labor Code Section 3700.**

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

- A. By being insured against liability to pay compensation in one or more insurers duly authorized to write compensation insurance in this state.
- B. By securing from the Director of Industrial Relations a certificate of consent to self-insure either as an individual employer, or as one employer in a group of employers, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to their employees."

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

\_\_\_\_\_  
Signature of Contractor

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Date

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

**END OF SECTION**

**TITLE 49, CODE OF FEDERAL REGULATIONS, PART 29**

The CONTRACTOR, under penalty of perjury, certifies that, except as noted below, he/she or any other person associated therewith in the capacity of owner, partner, director, officer, manager:

- A. Is not currently under suspension, debarment, voluntary exclusion, or determination of ineligibility by any Federal, State or local agency;
- B. Has not been suspended, debarred, voluntarily excluded or determined ineligible by any Federal, State or local agency within the past 3 years;
- C. Does not have a proposed debarment pending; and
- D. Has not been indicted, convicted, or had a civil judgment rendered against it by a court of competent jurisdiction in any matter involving fraud or official misconduct within the past 3 years.

If there are any exceptions to this certification, insert the exceptions in the following space.

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Exceptions will not necessarily result in denial of award, but will be considered in determining bidder responsibility. For any exception noted above, indicate below to whom it applies, initiating agency, and dates of action.

Notes: Providing false information may result in criminal prosecution or administrative sanctions. The above certification is part of the Proposal. Signing this Proposal on the signature portion thereof shall also constitute signature of this Certification.

\_\_\_\_\_  
Signature of Contractor

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Date

**END OF SECTION**



In accordance with Public Contract Code Section 10232, the Contractor, hereby states under penalty of perjury, that no more than one final unappealable finding of contempt of court by a Federal court has been issued against the Contractor within the immediately preceding two year period because of the Contractor's failure to comply with an order of a Federal court which orders the Contractor to comply with an order of the National Labor Relations Board.

\_\_\_\_\_  
Signature of Bidder

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Date

Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

**END OF SECTION**

This is an AGREEMENT made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 2023 by and between the County of Humboldt, a political subdivision of the State of California (hereinafter referred to as COUNTY) and \_\_\_\_\_ a corporation organized and existing under the laws of the State of \_\_\_\_\_, a partnership consisting of \_\_\_\_\_, an individual doing business as \_\_\_\_\_ in the State of California, (hereinafter referred to as "CONTRACTOR").

County and Contractor for the consideration hereinafter named agree as follows:

**SECTION 1 - SCOPE OF WORK**

Contractor shall furnish all labor, tools and materials and perform all the work for the construction of:

**HUMBOLDT COUNTY PROBATION BUILDING FIRE RECONSTRUCTION PROJECT  
PROJECT NUMBER: 170212F**

in accordance with the Contract Documents referred to in Section 3 of this Agreement.

The scope of work includes the work included in the "Base Bid" for the project and the following bid alternatives: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**SECTION 2 - CONTRACT PRICE**

County shall pay, and Contractor shall accept Contractor's Price, as follows:

\_\_\_\_\_ Dollars and \_\_\_\_\_ /100 (\$ \_\_\_\_\_ )

as full compensation for furnishing all materials and for doing all the work contemplated and embraced in this Agreement; also for all loss or damage, arising out of the work aforesaid, or from the actions of the elements, or from any unforeseen difficulties or obstructions which may arise or be encountered in the prosecution of the work until its acceptance by County, and for all risks of every description connected with the work; also for all expenses incurred by or in consequence of the suspension or discontinuance of the work and for well and faithfully completing the work, and the whole thereof, in the manner and according to the Plans and Specifications, and the requirements of the Owner.

**SECTION 3 - CONTRACT DOCUMENTS**

The complete contract between the parties hereto shall consist of the following, hereinafter referred to as the CONTRACT DOCUMENTS:

- |                                |                                  |
|--------------------------------|----------------------------------|
| Notice to Contractors          | General Conditions               |
| Bid Form                       | Supplementary General Conditions |
| Bid Security Form              | General Requirements             |
| This Agreement                 | Technical Specifications         |
| Payment Bond                   | Plans and Drawings               |
| Performance Bond               | Subcontractor List               |
| Insurance Certificates         | Noncollusion Affidavit           |
| Public Contract Code Statement | Bidders Qualifications           |

Special Conditions

Debarment and Suspension Certification

And, as published by the California Department of Industrial Relations:

General Prevailing Wage Rates

And any addenda to any of the above documents, all of which are on file in the office of the Director of Public Works of the County of Humboldt. Each of said CONTRACT DOCUMENTS is incorporated and made a part of this Agreement by the reference contained in this Section.

All rights and obligations of the County and the Contractor are fully set forth and described in the Contract Documents. All of the above named documents are intended to be complementary, so that any work called for in one, and mentioned in the other is to be performed and executed the same as if mentioned in all said documents.

**SECTION 4 - BEGINNING OF WORK**

Following receipt and full execution and approval of the Contract Documents, and posting of the requisite Bonds as called for therein, the COUNTY will issue a "Notice to Proceed". Under no circumstances shall the CONTRACTOR enter upon the site of work until receipt of the "Notice to Proceed", unless so authorized in writing by the COUNTY.

**SECTION 5 - TIME OF COMPLETION**

The work called for in this Agreement shall be commenced within ten (10) calendar days of the date of receipt by Contractor of the Notice to Proceed and shall be fully completed within 120 calendar days following receipt of the Notice to Proceed by the Contractor.

**SECTION 6 - PREVAILING WAGE**

Pursuant to Section 1770 of the Labor Code, the County has determined the Prevailing Wage Rate to be as listed by the Department of Industrial Relations, Division of Labor Statistics and Research, P.O. Box 420603, San Francisco, CA, 94101, Phone: (415) 703-4780. Complete Certified Payrolls must be submitted to the OWNER together with each application for progress payment. Electronic submittal directly to DIR may be required.

**SECTION 7 - WORKERS' COMPENSATION**

By my signature hereunder, as CONTRACTOR, I certify that I am aware of the provisions of Section 3700 of the Labor Code which requires every employer to be insured against liability for Workers' Compensation or to undertake self-insurance in accordance with the provisions of that code, and I will comply with such provisions before commencing the performance of the work of this contract.

**SECTION 8 - NOTICES**

All notices shall be in writing and delivered in person or transmitted by mail. Notices required to be given to the COUNTY shall be addressed as follows:

Humboldt County Department of Public Works  
1106 Second Street  
Eureka, CA 95501

Notices required to be given to CONTRACTOR shall be addressed as follows:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**SECTION 9 - NUCLEAR FREE HUMBOLDT COUNTY ORDINANCE COMPLIANCE**

Neither the Contractor, his Subcontractors or their suppliers are Nuclear Weapons Contractors, and are not knowingly or intentionally engaged in the research, development, production, or testing of nuclear warheads, nuclear weapons systems, or nuclear weapons components, as defined by the Nuclear Free Humboldt County Ordinance. Contractor, his Subcontractors and/or their suppliers agree to notify Owner immediately if they become a nuclear weapons contractor as defined above.

IN WITNESS WHEREOF, The parties hereto have entered into this Agreement as of the date first above set forth.

**COUNTY OF HUMBOLDT**

(SEAL)

By: \_\_\_\_\_  
Chairperson, Board of Supervisors of the County of Humboldt, State of California

ATTEST:

By: \_\_\_\_\_  
Clerk of the Board of Supervisors of the County of Humboldt, State of California

**CONTRACTOR:** Corporations require signature by two (2) corporate officers

By: \_\_\_\_\_

Title: \_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_

APPROVED AS TO FORM:

By: \_\_\_\_\_  
Deputy County Counsel

INSURANCE CERTIFICATES, PERFORMANCE AND PAYMENT BONDS REVIEWED AND APPROVED:

By: \_\_\_\_\_  
Risk Manager

**END OF SECTION**

CONSTRUCTION PERFORMANCE BOND

This Construction Performance Bond ("Bond") is dated \_\_\_\_\_, is in the penal sum of \_\_\_\_\_ and is entered into by and between the parties listed below to ensure the faithful performance of the Construction Contract identified below. This Bond consists of this page and the Bond terms and Conditions, Paragraphs 1 through 13, attached hereto. Any singular reference to \_\_\_\_\_ ("Contractor"), \_\_\_\_\_ ("Surety"), the County of Humboldt ("Owner") or other party shall be considered plural where applicable.

CONTRACTOR:

SURETY:

\_\_\_\_\_  
Name

\_\_\_\_\_  
Name

\_\_\_\_\_  
Address

\_\_\_\_\_  
Principal Place of Business

County of Humboldt  
c/o Humboldt County Public Works  
1106 Second Street  
Eureka, California 95501

CONSTRUCTION CONTRACT:  
**Humboldt County Probation Building  
Fire Reconstruction Project**  
Project #170212F

Attn: Thomas K. Mattson  
Director of Public Works

DATED \_\_\_\_\_, 20\_\_\_\_, in  
the amount of \$ \_\_\_\_\_.

CONTRACTOR AS PRINCIPAL  
Company: \_\_\_\_\_ (Corp. Seal)

SURETY  
Company: \_\_\_\_\_ (Corp. Seal)

Signature: \_\_\_\_\_

Signature: \_\_\_\_\_

\_\_\_\_\_  
Name and Title:

\_\_\_\_\_  
Name and Title:

**BOND TERMS AND CONDITIONS**

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to Owner for the complete and proper performance of the Construction Contract, which is incorporated herein by reference.
2. If the Contractor completely and properly performs all of its obligations under the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond.
3. The Surety's obligation under this Bond shall arise after:
  - A. Owner has declared a Contractor Default under the Construction Contract pursuant to the terms of the Construction Contract; and
  - B. Owner has agreed to pay the Balance of the undisputed Contract Sum to:
    1. The Surety in accordance with the terms of this Bond and the Construction Contract; or,
    2. To a contractor selected with the Owner's concurrence to perform the Construction Contract (per paragraph 4, below) in accordance with the terms of this Bond and the Construction Contract.
4. When Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly, and in no event later than thirty (30) days after the Owner confirms in writing that it has satisfied the conditions of Paragraph 3, and at the Surety's sole expense, confirm in writing as to its election to take one of the following actions:
  - A. Arrange for the Contractor, with consent of Owner, to perform and complete the Construction Contract (but Owner may withhold consent in its sole discretion (with or without cause), in which case the Surety must immediately elect option 4B, 4C or 4D, below), and that such performance shall commence within an additional thirty (30) days; or
  - B. Undertake to perform and complete the Construction Contract itself, through its agents or through independent contractors, and that such performance shall commence within an additional thirty (30) days; or
  - C. As promptly as reasonably possible, obtain bids from qualified, responsible contractors acceptable to Owner for a contract for performance and completion of the Construction Contract, and, upon determination by Owner that the contractor selected with Owner's concurrence is responsible, and subject to full compliance with all applicable laws as may be required (including, without limitation, any applicable competitive bidding and public contracting and procurement requirements pursuant to California and/or Federal laws, if applicable), arrange for a contract to be prepared for execution by Owner and the contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract and subject to the consent of Owner; and, if the Surety's obligations defined in Paragraph 6 exceed the Balance of the Contract Sum, then the Surety shall pay to Owner the amount of such excess; or
  - D. Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and subject to its investigation and consultation with Owner, determine in good faith the amount for which it may then be liable to Owner under Paragraph 6 for the

performance and completion of the Construction Contract and, within ten (10) additional calendar days, tender payment therefor to Owner with full explanation of the payment's calculation. If Owner accepts the Surety's tender under this paragraph 4(D), the Surety shall remain liable for future damages, then unknown or unliquidated, and including, without limitation, additional costs incurred to complete the Construction Contract and any unsatisfied liquidated damages, resulting from the Contractor Default. If Owner disputes the amount of Surety's tender under this paragraph 4(D), Owner may exercise all remedies available to it at law to enforce the Surety's liability under paragraph 6.

5. If the Surety does not proceed as provided in Paragraph 4, then the Surety shall be deemed to be in default on this Bond ten (10) days after receipt of an additional written notice from Owner to the Surety demanding that the Surety perform its obligations under this Bond. At all times Owner shall be entitled to enforce any remedy available to Owner at law or under the Construction Contract including, without limitation, and by way of example only, rights to perform work, protect work, mitigate damages, or coordinate work with other consultants or contractors.
6. The Surety's monetary obligation under this Bond is limited by the amount of this Bond. Subject to these limits, the Surety's obligations under this Bond are commensurate with the obligations of the Contractor under the Construction Contract. The Surety's obligations shall include, but are not limited to:
  - A. The responsibilities of the Contractor under the Construction Contract for completion of the Construction Contract and correction of defective, deficient and/or non-compliant work;
  - B. The responsibilities of the Contractor under the Construction Contract to pay liquidated damages, and for damages for which no liquidated damages are specified in the Construction Contract, actual damages, and all damages caused by non-performance or lack of proper performance of the Construction Contract, including but not limited to, all valid and proper backcharges, offsets, payments, indemnities, and/or other damages;
  - C. Additional administrative, management, legal, design professional and delay costs resulting from the Contractor Default or resulting from the actions or failure to act of the Surety under Paragraph 4.
7. No right of action shall accrue on this Bond to any person or entity other than Owner or its heirs, executors, administrators, or successors.
8. The Surety hereby waives notice of any change, alteration or addition to the Construction Contract or to related subcontracts, purchase orders and other obligations, including changes of time. The Surety consents to all terms of the Construction Contract, including provisions on changes to the Contract. No extension of time, change, alteration, modification, deletion, or addition to the Contract Documents, or of the work required thereunder, shall release or exonerate Surety on this Bond or in any way affect the obligations of Surety on this Bond.
9. Any proceeding, legal or equitable, under this Bond shall be instituted in the Superior Court for the County of Humboldt.
10. As a part of the obligation secured under this Bond, and in addition to the face amount specified therefore, there shall be included costs and reasonable expenses and fees, including reasonable attorney's fees and expert costs, incurred by the County in successfully enforcing any obligation arising under this Bond, all to be taxed as costs and included in any judgment rendered
11. Notice to the Surety, Owner or the Contractor shall be mailed or delivered to the address shown on the signature page.

12. Any provision in this Bond conflicting with any statutory or regulatory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein.
13. Definitions.
  - A. Balance of the Contract Sum: The total amount payable by Owner to the Contractor pursuant to the terms of the Construction Contract after all proper adjustments have been made under the Construction Contract, for example, deductions for progress payments made, and increases/decreases for approved modifications to the Construction Contract.
  - B. Construction Contract: The agreement between Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.
  - C. Contractor Default: Material failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract.

**END OF SECTION**



KNOW ALL MEN BY THESE PRESENTS, THAT WHEREAS, the County of Humboldt, by its order made \_\_\_\_\_, 20\_\_\_\_, has awarded to \_\_\_\_\_,

hereinafter designated as the "Principal," a contract for the work described as follows:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

NOW, THEREFORE, we the Principal and Surety, are held and firmly bound unto the County of Humboldt 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 Principal, his/her or its heirs, executors, administrators, successors or assigns, shall fail to pay any of the persons named in Section 9100 of the Civil Code, or amounts due under the Unemployment Insurance Code with respect to work or labor performed by any such claimant, any prevailing wages due and penalties incurred pursuant to the California Labor Code or for any amounts required to be deducted, withheld, and paid over to the Franchise Tax Board from the wages of employees of the Contractor and their subcontractors pursuant to Section 18806 of the Revenue and Taxation Code with respect to such work and labor as required by Sections 9550 et seq. of the Civil Code of California, then said Surety will pay for the same, in or to an amount not exceeding the amount set forth herein, 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 in the above-mentioned statutes provided.

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

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

\_\_\_\_\_  
PRINCIPAL

\_\_\_\_\_  
SURETY

BY: \_\_\_\_\_

BY \_\_\_\_\_  
ATTORNEY-IN-FACT

**END OF SECTION**

## PART 1 GENERAL

### 1.1 SUMMARY

- A. This section includes administrative and procedural requirements for alternates.

### 1.2 DEFINITIONS

- A. Alternate: An alternate is an amount proposed by bidders and stated on the Bid Form that will be added to or deducted from Base Bid amount if the Owner decides to accept a corresponding change in either scope of work or in products, materials, equipment, systems or installation methods described in Contract Documents.
1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

### 1.3 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.
- E. The successful low bidder will be the contractor providing the lowest base bid, including the alternate bids.
- F. Acceptance of alternate bids will not change the number of days allowed for work under this contract.

## PART 2 PRODUCTS (NOT USED)

## PART 3 EXECUTION (NOT USED)

### 3.1 EXECUTION

- A. ~~Deductive-Additive~~ Alternates:
1. Casework and Plumbing Fixtures in Room #100: Breakroom.
  2. Casework in Room #111: Processing
  3. Site Improvements along Munson Street from the entrance to the Probation Building to Harrison Avenue.

**END OF SECTION**

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GC 1. DEFINITIONS

- A. COUNTY: The term "County", or pronouns in place of same where used herein, shall mean Humboldt County acting through its Board of Supervisors.
- B. BOARD: The term "Board", or pronouns in place of same where used herein, shall mean the Humboldt County Board of Supervisors.
- C. OWNER: The "Owner" is the County and is the person or entity identified as such in the Owner-Contractor Agreement; the term Owner means the Owner or its authorized representative.
- D. ARCHITECT: The term "Architect" shall mean the licensed professional architect in responsible charge of the design of the project employed or contracted by the Humboldt County Department of Public Works as the authorized representative of the Owner.
- E. CONTRACTOR: The term "Contractor" or "General Contractor", where used herein, shall mean the Contractor licensed by the California Contractors State License Board to whom the contract for the work described and specified herein has been awarded by the Humboldt County Board of Supervisors or their authorized representative.
- F. PLANS AND SPECIFICATIONS: The term "Plans and Specifications", where used herein, shall mean and include all specifications and provisions of every kind, whether general, detailed or otherwise, relating to the equipment, material or Work, and the installation thereof, and the plans and drawings accompanying same which are made a part thereof. Such Plans and Specifications are recognized as instruments of professional service.
- G. OWNER'S REPRESENTATIVE: The term "Owner's Representative" shall mean the agent or independent qualified consultant assigned to the Project by Humboldt County Department of Public Works. The Owner's Representative shall not be responsible for means, methods, techniques, sequences or procedures of construction, nor be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The term "Project Manager" as referenced throughout the technical specifications is synonymous with "Owner's Representative."
- H. CONSTRUCTION ADMINISTRATOR: The term "Construction Administrator" shall mean the agent or independent qualified consultant assigned to the Project by Humboldt County Department of Public Works. The Construction Administrator may be a separate agent or may also perform the function of the Project Inspector or Owner's Representative. The Construction Administrator will be the prime point of contact between the Contractor and Owner. The Construction Administrator will log, route, and maintain all project communications and documentation including, but not limited to, letters of instruction, contractor letters, requests for information, submittals, cost proposals and changes to the work.
- I. PROJECT INSPECTOR: The term "Project Inspector" shall mean the agent or independent qualified consultant assigned to the Project by Humboldt County Department of Public Works to perform the following services: Observe the performance of Project labor, installation of all materials and equipment to be incorporated into the Work and the placing of such materials and equipment to determine in general if the Work is proceeding in accordance with the Contract Documents as defined in section 00 52 00 "Agreement Forms". On the basis of such observations, the Project Inspector will keep the Owner's Representative informed as to the progress of the Work. The Project Inspector shall not be responsible for means, methods, techniques, sequences or procedures of construction, nor be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents.
- J. SURETY: The term "Surety" shall mean the surety or sureties that issue the Payment Bond and/or the Performance Bond required by the Contract Documents.

- K. CONTRACT or AGREEMENT: "Contract" or "Agreement" shall mean the agreement signed by County and Contractor (Section 00 52 00) and shall also mean the totality of the contractual obligations of Contractor hereunder.
- L. CONTRACT PRICE: "Contract Price" shall mean the amount set forth as the contract price in the Agreement (Section 00 52 00).
- M. CONTRACT TIME: "Contract Time" shall mean the time for completion of the Work required by the Contract Documents as set forth in the Agreement (Section 00 52 00),
- N. PROJECT: The "Project" is the total construction of which the Work performed under the Contract Documents may be the whole or a part.
- O. SUBSTANTIAL COMPLETION: "Substantial Completion", shall mean that the Work is sufficiently complete, in accordance with the Contract Documents, that the County can occupy or utilize the Work or a designated portion thereof for the use for which it is intended.
- P. WORK: The "Work" comprises the completed construction required by the Contract Documents and approved change orders and includes all labor necessary to produce such construction, and all materials and equipment incorporated or to be incorporated in such construction.

Capitalized terms not defined in these General Conditions shall have the same meaning as defined in other Contract Documents.

GC 2. CONTRACT

- A. The Contract Documents include all documents identified as such in the Agreement (Section 00 52 00), and any amendments and Change Orders thereto
- B. In the execution of the Work or any portion thereof, Contractor shall operate as an independent contractor and not as the agent of Owner or Architect.
- C. No verbal agreement or conversation with any officer, agent, or employee of Owner or Architect, either before or after execution of the Agreement, shall affect or modify any terms or obligations of the Contract unless duly incorporated into the Contract by written Change Order or amendment of the Contract.
- D. The Contract Documents shall not be construed to create any contractual relationship of any kind between the Architect and the Contractor, but the Architect shall be entitled to performance of obligations intended for its benefit, and to enforcement thereof. Nothing contained in the Contract Documents shall create any contractual relationship between the Owner or the Architect and any subcontractor or sub-subcontractor.
- E. By executing the Contract, the Contractor represents that Contractor has visited the Project site, familiarized itself with the local conditions under which the Work is to be performed, and correlated its observations with the requirements of the Contract Documents.
- F. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work. The Contract Documents are complementary, and what is required by any one shall be as binding as if required by all. Contractor shall perform all work set forth in the Contract Documents and reasonably inferable therefrom as being necessary to produce the intended results. Words and abbreviations which have well-known technical or trade meanings are used in the Contract Documents in accordance with such recognized meanings.

Whenever two or more standards or requirements appear in the Contract Documents, the highest standard or requirement shall be applied and followed in the performance under this Contract. If a conflict cannot be so resolved, the following shall apply:

- (a) In cases of discrepancy concerning dimension, quantity and location, the Plans shall take precedence over the Specifications. Explanatory notes on the Plans shall take precedence over conflicting drawn indications. Large-scale details shall take precedence over smaller scale details and figured dimensions shall take precedence over scaled measurement. Where figures are not shown, scale measurements shall be followed but shall in all cases be verified by measuring actual conditions of Work already in place. In cases of discrepancy concerning application of materials and non-technical requirements over materials, the specifications shall take precedence over Plans.
- (b) For all other conflicts between terms of the Contract Documents that cannot be resolved as set forth above, the following order of precedence shall apply:
  - 1. The Contract
  - 2. The Supplementary Conditions
  - 3. The General Conditions
  - 4. The Specifications
  - 5. The Plans.

G. The organization of the Specifications into divisions, sections and articles, and the arrangement of drawings shall not control the Contractor in dividing the Work among subcontractors or in establishing the extent of Work to be performed by any trade.

GC 3. BONDS

- A. Contractor, simultaneously with the execution of the Agreement, will be required to furnish a Payment Bond in an amount equal to one hundred (100%) percent of the Contract Price, and a faithful Performance Bond in an amount equal to one hundred (100%) percent of the Contract Price. The Contractor must submit a certificate with all bonds indicating that the Surety is admitted to transact business in the State of California, and certify that the Surety's certificate of authority, issued by the Insurance Commissioner, has not been suspended, revoked, canceled, or annulled.
- B. The bonds shall comply with Section 9554 of the Civil Code of the State of California. The Payment Bond and the faithful Performance Bond shall each be in a form that is satisfactory to the County Counsel, or Risk Management of the County of Humboldt. A copy of an acceptable format is attached to the Agreement forms of these specifications.
- C. All Bonds shall meet or exceed A.M. Best's Long-Term Issuer Credit Rating (Long-Term ICR) Scale categories of Rating Category: **Excellent**; Rating Symbol: **a**; Rating Notch: **a+**, and Short-Term Issuer Credit Rating (Short-Term ICR) Scale categories of Rating Category: **Outstanding**; Rating Symbol: **AMB-1**, and Best's Financial Strength Rating (FSR) Scale categories of Rating Category: **Excellent**, Rating Symbol: **A**, Rating Notch: **A-**. All bonds shall be written by a surety company licensed through the California Department of Insurance and shall have a physical presence in the State of California. Companies providing reinsurance to the surety company shall also be a surety company licensed through the California Department of Insurance and shall have a physical presence in the State of California. The Bid Bond, Payment Bond and Performance Bond shall all be written by the same surety company. If cash or securities are provided in lieu of a Bid Bond, then both the Payment Bond and Performance Bond shall both be written by the same surety company. "Off-shore" surety companies and/or reinsuring sureties or companies shall not be accepted.

GC 4. INSURANCE REQUIREMENTS

- A. THIS CONTRACT/AGREEMENT SHALL NOT BE EXECUTED BY COUNTY and the CONTRACTOR is not entitled to any rights, unless certificates of insurance, or other sufficient proof, showing that the following provisions have been complied with are filed with the Clerk of the Humboldt County Board of Supervisors.

- B. Without limiting Contractor's indemnification obligations provided herein, Contractor shall, and shall require any of its subcontractors, to take out and maintain, throughout the period of this Agreement, the policies of insurance as required herein placed with insurers with a current A.M. Best's rating of no less than A:VII or its equivalent against damages which may arise from or in connection with the activities hereunder of Contractor, its agents, employees or subcontractors.
- C. Comprehensive or Commercial General Liability Insurance at least as broad as Insurance Services Office Commercial General Liability coverage (occurrence from CG 0001), in an amount of \$2,000,000 per occurrence. If work involves explosive, underground or collapse risks, XCU must be included. If a general aggregate limit is used, either the general aggregate limit shall apply separately to this project or the general aggregate shall be \$5,000,000. Said policy shall contain, or be endorsed with, the following provisions:
1. The County, and its Board Members, officers and officials, Owner's Representative, Construction Administrator, Project Inspector and the Architect and their agents and employees, are covered as additional insured for liability arising out of the operations performed by or on behalf of Contractor. The coverage shall contain no special limitations on the scope of protection afforded to the County, and its Board Members, officers and officials, Owner's Representative, Construction Administrator, Project Inspector and the Architect and their agents, and employees. The additional insured coverage required herein shall be provided by Insurance Services Office Additional Insured Endorsement Forms CG 20 10 and CG 20 37, or equivalent forms.
  2. The policy shall not be canceled or materially reduced in coverage without thirty (30) days prior written notice (10 days for non-payment of the premium) to County by certified mail.
  3. The inclusion of more than one insured shall not operate to impair the rights of one insured against another insured, and the coverage afforded shall apply as though separate policies had been issued to each insured, but the inclusion of more than one insured shall not operate to increase the limits of the insurer's liability.
  4. For claims related to this Project, the Contractor's insurance is primary coverage to the County, and any insurance or self-insurance programs maintained by the County are excess to Contractor's insurance and will not be called upon to contribute with it.
  5. Any failure by the County or the Contractor to comply with reporting or other provisions, including breach of warranties, shall not affect coverage provided to County, and its Board Members, officers and officials, Owner's Representative, Construction Administrator, Project Inspector and the Architect and their agents, and employees.
- D. Automobile liability insurance with coverage at least as broad as Insurance Services Office form CA 0001 06092, Code 1 (any auto), for vehicles used in the performance of this Agreement with minimum coverage of not less than \$1,000,000 per accident combined single limit (CSL). Such policy shall contain or be endorsed with the provision that coverage shall not be canceled or materially reduced in coverage without thirty (30) days prior written notice (10 days for non-payment of premium) to County by certified mail.
- E. Workers' Compensation insurance meeting statutory limits of the California Labor Code which policy shall contain or be endorsed to contain a waiver of subrogation against County, its officers, agents, and employees and provide for thirty (30) days prior written notice in the event of cancellation.
- F. Builder's Risk or Course of Construction, written on an "All-Risk" form, for 100% of the completed value of the insurable part of the Project. The Builder's Risk policy shall provide for losses to be payable to County and the Contractor as their interests may appear, and that in the event of payment for any loss under the coverage provided, the insurer shall have no rights of recovery against County and Contractor.
- G. Contractor shall furnish County with certificates and original endorsements effecting the required coverage prior to execution of this Agreement by County. The endorsements shall be on forms as approved by the County's Risk Manager or County Counsel. Any deductible or self-insured retention over \$100,000 shall be disclosed to and approved by County. If Contractor does not keep



all required policies in full force and effect, County may, in addition to other remedies under this Agreement, take out the necessary insurance, and Contractor agrees to pay the cost of said insurance.

GC 5. DEFAULT/TERMINATION OF CONTRACT

A. Default

1. If the Contractor refuses or fails to prosecute the Work or any separable part thereof with such diligence as will ensure its completion within the time specified herein or any authorized extension thereof, or abandons the Work, or fails to perform the Work in a manner required by the Contract Documents and/or industry standards, or fails to complete such Work within such time as required under the Contract Documents, or seeks to assign the Contract, or, if the Contractor should be adjudged as bankrupt, or is otherwise deemed insolvent by the County based on good cause and is unable to proceed with the Work, or if the Contractor should make a general assignment for the benefit of creditors, or if a receiver should be appointed on account of insolvency, or if the Contractor files a petition to take advantage of any debtor's act, or should any subcontractor materially violate any of the provisions of the Contract Documents, or if the Contractor should persistently or repeatedly refuse or fail to provide the required project management, supervision, quality control, and/or supply enough properly skilled workers or proper materials to complete the Work in the time specified, or if the Contractor should fail to make prompt payment to subcontractors for material or labor, or if the Contractor should persistently disregard laws, or instructions given by County, or if the Contractor otherwise substantially fails to fulfill its obligations under, or violates, the Contract Documents or any provision or term thereof, the Contractor shall be in breach of and default under the Contract. In such instance, the County may, in its sole discretion, after providing Contractor seven (7) days written notice, and without prejudice to any other remedy the County may have:
  - a. Provide any such labor, equipment and/or materials required to perform the Work or designated portion of the Work or to correct any deficiencies or delays and deduct the cost from any money due or to become due Contractor, or if the money due or to become due to Contractor is not sufficient to cover such amount, the Contractor shall pay the difference immediately to the County upon demand; or
  - b. Terminate the Contract.
2. Upon receipt of the notice of termination of the Contract, the Surety shall immediately takeover and assume the control of and perform the Work as the successor to the Contractor and shall immediately assume all rights obligations and liabilities, including liquidated damages, that have accrued under the Contract. The Surety shall maintain the Project site and all of its safety controls. If the Surety fails to maintain the Project site, the County may correct unsafe conditions and charge the Surety for costs incurred. If the Surety assumes the Contractor's terminated Work, it shall take the Contractor's place in all respects for that part and shall be paid by County for all Work performed by it in accordance with the terms of the Contract Documents. If the Surety assumes the entire Contract, all money due the Contractor at the time of its default shall be payable to the Surety as the Work progresses, subject to the terms of the Contract Documents less all amounts due to County.
3. Within fifteen (15) working days of its receipt of the notice of termination of the Contract, the Surety shall provide to the County a written plan detailing the course of action it intends to take to remedy the default of the Contractor. The County will review and notify the Surety if the plan is satisfactory.
4. If the Surety fails to submit a satisfactory plan or to maintain progress on the plan as accepted by the County, or does not otherwise comply fully and completely to the County's satisfaction with the terms of the Performance Bond within the time periods stated therein, the County may, in its sole discretion, take over the Work and prosecute the same to completion by contract or by any other method it may deem advisable for the account and at the expense of the Contractor, and the Surety

and/or Contractor shall be liable to the County for any excess cost and all other damages and costs incurred by the County thereby or to which the County is entitled under the Contract Documents or by law and shall pay the County all such amounts within thirty (30) days after submits an invoice for such amounts. . In such an event, the County may without liability for so doing, take possession of and utilize such materials, tools, equipment, supplies and other property belonging to the Contractor and/or assume assignment of any and all subcontracts for subcontractors and/or suppliers that may be on the worksite and be necessary to complete the Work. For any portion of such Work that County elects to complete by furnishing its own employees, materials, tools, and equipment, the Contractor and Surety shall compensate County or all costs related thereto. If requested by County, Contractor shall demobilize, and shall remove any part or all of Contractor's materials, supplies, equipment, tools, and construction equipment and machinery, from the Project site within 7 days of such request; and if Contractor fails to do so, County may remove or store, and after 90 days sell, any of the same at Contractor's expense.

5. If a termination for default is asserted by County, and demand made upon Surety by County, Surety shall not tender the Contractor, or any affiliate thereof, as its completion contractor except as authorized in the Performance Bond and subject to the sole discretion of the County. See the Performance Bond for more details on the rights and responsibilities of the Surety.
6. Contractor hereby consents to assigning to the County and/or County's replacement contractor all subcontracts and other agreements of any and all subcontractors and/or suppliers that may be on the worksite and/or may be necessary to complete the Work in the event of Termination for Default or Termination for Convenience, as set forth below. Contractor agrees to obtain, by way of a subcontract provision, the consent of each and every subcontractor and/or supplier for such assignment prior to the commencement of each such subcontractor's and/or supplier's conduct of the Work.
7. In the event of such termination, the Contractor will not be entitled to receive any further payment until the entire Work or disputed portion of the Work is completed and accepted by the County. Any amounts due to Contractor will be based on unit prices or lump sum bid and the quantity of Work completed at the time of termination, less damages caused to the County by acts of the Contractor causing the termination, including but not limited to, all costs to the County arising from professional services and attorneys' fees, and all costs generated to insure or bond the work of substituted Contractors or subcontractors utilized to complete the Work, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the County promptly upon demand. On failure of the Contractor to pay, the Surety shall pay on demand by County. Any portion of such difference not paid by the Contractor or Surety within thirty (30) days following the mailing of a demand for such costs shall earn interest at the maximum rate authorized by California law. Nothing set forth herein shall limit Surety's obligations under the subject bonds or the timing thereof, which shall arise immediately upon Contractor's default.
8. The Contractor and the County agree that nothing in this section is intended to create a right of either party to recover attorney fees as prevailing party in any lawsuit on this Contract.
9. In addition to all of its rights and remedies stated herein and under the Contract Documents and by law, the County may also order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the County to stop the Work shall not give rise to any duty on the part of the County to exercise this right for the benefit of the Contractor or any other person or entity
10. The foregoing provisions are in addition to and not in limitation of any other rights or remedies under law or in equity available to County.
11. If it is later determined that the County's termination of the Contract was wrongful, or Contractor had an excusable reason for not performing, such as a fire, flood, or other event which was not the fault of or was beyond the control of the Contractor, the County, after setting up a new performance schedule, may allow the Contractor to continue work, or treat the termination as a termination for convenience,

and the rights and obligations of the County and the Contractor shall be the same as if the termination had been issued for the convenience of the County.

12. Each of these general conditions, whether preceding or following this paragraph, is to be considered material and failure to comply with any of such conditions by the Contractor will be deemed a breach of contract. All obligations of Contractor pursuant to the Contract Documents shall survive the termination of the Contract.

**B. Termination for Convenience**

1. The County may terminate the Contractor's performance under the Contract, either in whole or in part, at its own discretion or when conditions encountered during the Work make it impossible or impracticable to proceed, or when the County is prevented from proceeding with the Contract by act of God, by law, or by official action of a public authority, or upon a determination that such termination is in the best interest and convenience of the County, or whenever the County is prohibited from completing the Work for any reason.
2. Upon receipt of such written notice of termination, the Contractor shall:
  - a. Stop work as specified in the written notice;
  - b. Terminate all orders and subcontractors except as necessary to complete any portion of the Work that is not terminated;
  - c. If directed in writing by the County to do so, assign all right, title and interest in subcontracts and materials in progress, in which case the County will have the right at its discretion to settle, or pay any or all claims arising out of the termination of such subcontractors, but in no event shall recovery by any Contractor include lost profits for uncompleted portions of the Work;
  - d. Deliver or otherwise make available to the County all data, drawings, specifications, reports, estimates, summaries and such other information and material as may have been accumulated by the Contractor in performing the Work whether completed or in process;
  - e. Settle outstanding liabilities and claims with the approval of County;
  - f. Complete performance of such part of the Work as has not been terminated; and
  - g. Take such other actions as may be necessary, or as may be directed by the County for the protection and preservation of the Work and/or property related to the Work.
3. Upon receipt of County's written notice of termination for convenience, the Contractor shall submit to the County a request for final payment in accordance with the requirements of the Contract. Such request shall be submitted promptly, but no later than sixty (60) days from the effective date of the termination for convenience.
4. The final payment to the Contractor after termination for convenience shall be limited to the following amounts due and owing under the Contract at time of termination:
  - a. Any actual costs incurred by the Contractor for restocking charges;
  - b. The agreed upon price of protecting the Work in any manner, if any, as directed by the County; and
  - c. The Contract Price allocable to the portion of the Work properly performed or goods supplied by the Contractor as of the date of termination, as determined in accordance with the Contract Documents, reduced by any sums previously paid to the Contractor.

Contractor shall not be entitled to payment for any Work not performed, including, without limitation, overhead and profit on Work not performed.

The above payment shall be the sole and exclusive remedy to which Contractor is entitled in the event of a termination for convenience of the Contract pursuant to this section; and Contractor will not be entitled to any other compensation or damages and expressly waives same.

5. The County shall have the right to withhold any portion or the whole of the final payment under this provision in the event there are any outstanding Claims for compensation asserted by the County against the Contractor, or by any third party against the County which arises out of the Contractor's Work.
6. All obligations of Contractor pursuant to the Contract Documents shall survive the termination for convenience of the Contract.
7. Contractor shall include this Termination for Convenience provision in all subcontracts and purchase orders of every tier.

GC 6. INDEMNIFICATION

- A. To the fullest extent permitted by law, the Contractor shall indemnify, defend and hold harmless the County and its Board Members, officers and officials, Owner's Representative, Construction Administrator, Project Inspector, and the Architect and their agents and employees (the "Indemnified Parties") from and against any and all claims, damages, liabilities, actions, losses and expenses, including but not limited to attorneys' fees, in law and in equity, of every kind or nature whatsoever related to, arising out of or resulting from the performance of the Work or Contractor's operations to be performed under the Contract Documents, regardless of whether or not caused in whole or in part by a party indemnified hereunder (collectively "Claims"); excepting only such Claims arising from the sole or active negligence or willful misconduct of the Indemnified Parties or defects in design furnished by those persons. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this paragraph. The obligations in this section shall not be limited by the insurance requirements set forth in these Contract Documents. Contractor's indemnification obligations shall apply to all damages or claims for damages suffered as a result of or by Contractor's operations regardless if any insurance is applicable or not.

It is intended that this section shall comply with California Civil Code § 2782, *et seq.*, to the extent applicable to the Contractor's obligations as set forth in this section. If it is determined by a Court of competent jurisdiction that any aspect of this section exceeds the restrictions or limitations under California law applicable to indemnity obligations, only that portion which exceeds the restrictions or limitations under California law shall be null and void, and all remaining indemnity obligations shall be fully enforceable to the fullest extent allowed under California law.

- B. In any and all Claims against the Indemnified Parties by any employee of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this paragraph shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any subcontractor under Workers' or Workmen's Compensation Acts, disability benefit acts or other employee benefit acts.
- C. The right to a defense and indemnity under this section arises upon an occurrence of an event given rising to a Claim and upon tender to Contractor, Contractor shall defend the Indemnified Parties with counsel reasonably acceptable to the County. Notwithstanding the foregoing, the County shall be entitled, on its own behalf, and at the expense of the Contractor, to assume control of its defense or the defense of any Indemnified Party in any legal proceeding, with counsel reasonably selected by it. Should the County elect initially to assume control of its defense, or the defense of any Indemnified Party, it does so without prejudice to its right subsequently to request

that Contractor thereafter assume control of the defense and pay all attorney's fees and costs incurred thereby.

GC 7. ASSIGNMENT OF CONTRACT

- A. The Contractor shall not assign or sublet the Contract in whole or in part without the prior written consent of the Owner. The Contractor shall not assign any monies due or to become due to it under the Contract without the prior written consent of the Owner.
- B. Any assignments permitted under these documents or approved by the Owner shall, in addition, have prior written approval of all sureties of the Contractor executing bonds or insurance in the interest of this Contract.
- C. If the Contractor seeks to assign any portions or monies as permitted, Contractor shall pay to the Owner \$1,000 to cover Owner's costs each time an assignment occurs.

GC 8. SEPARATE CONTRACTS

- A. The Owner reserves the right to let other contracts in connection with this Project. The Contractor shall afford all other such contractors reasonable opportunity for storage of their materials; shall provide that the execution of their work properly connects and coordinates with theirs; and shall cooperate with them to the end of facilitating the Work.
- B. The work performed or executed under other contracts in advance of work under this Contract shall be inspected and determined to be in proper condition by the Contractor before permitting related or connecting work to proceed under this Contract.
- C. Contractor shall immediately notify Architect, Owner's Representative, and Project Inspector through the Construction Administrator of any discrepancies, defects or other conditions found unsuitable for proper execution of the Work.

GC 9. CONFERENCES

- A. At any time during the progress of the Work, the Owner, Construction Administrator, Owner's Representative, or Architect shall have authority to require the Contractor to attend a conference of any or all of the contractors engaged in the Work; and any notice of such conference shall be duly observed and complied with by the Contractor.

GC 10. TERMS OF PAYMENT

- A. Within thirty (30) calendar days after the award of the Agreement, and before submission of the first application for payment, the Contractor shall submit to the County for approval a Schedule of Values allocated to the various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the County may require. This schedule, unless objected to by the County, shall be used only as a basis for the Contractor's Applications for Payment. This Schedule of Values shall be so arranged that the value of the Work as it progresses may be readily determined. Payment for change order work will be made if the change order work is complete and is approved prior to the Owner's Representative issuing the monthly certification of payment. The total sum of the Schedule of Values shall equal the Contract Price.
- B. The Contractor shall, on or before the first day of each month, make an estimate of the work performed during the preceding month and submit an itemized application for payment, supported by such data substantiating the Contractor's right to payment as the County may require, including appropriate monthly updates to the construction progress schedule, and reflecting retention, if any, as provided elsewhere in the Contract Documents. Absent an express finding pursuant to Public Contract Code section 7201(b) authorizing the County to withhold a higher amount of retention (in excess of 5% of the estimated value of the work done and the labor, materials, equipment, and

services provided), the County shall retain an amount from each progress payment not to exceed 5% of the estimated value of the work done and the labor, materials, equipment, and services provided, all in accordance with Public Contract Code section 7201, and the County shall pay to the Contractor ninety percent (95%) of the value of said work in place, as checked and approved, within thirty (30) calendar days of the County's receipt of an undisputed and properly submitted application for payment. The balance of five percent (5%) of the estimate shall be retained by the County until the time of final acceptance of the Work, and release in accordance with requirements of the Contract Documents and California law. In lieu of the five percent (5%) retainage, the Contractor may substitute securities as provided for in Public Contract Code Section 22300.

- C. As a condition precedent to payment by County, each itemized application for payment shall be accompanied by a current Conditional Waiver and Release On Progress Payment, in the form specified by the applicable California Civil Code, from Contractor and each of Contractor's subcontractors, suppliers, and union trust funds for which payment is sought by the application for payment, and an Unconditional Waiver and Release On Progress Payment, in the form specified by the applicable California Civil Code, from Contractor and each of Contractor's subcontractors, suppliers, and any union trust fund for which payment was sought by Contractor in the immediately preceding application for payment and for which the County made payment.
- D. The Contractor warrants that title to all work, materials and equipment covered by an application for payment will pass to the County, or its assignee, either by incorporation in the construction or upon receipt of payment by the Contractor, whichever occurs first, free and clear of all liens, stop notices, claims, security interest or encumbrances hereinafter referred to in this section as "liens"; and that no work, materials or equipment covered by an application for payment will have been acquired by the Contractor, or by any other person performing work at the Project or furnishing materials and equipment for the Project, subject to an agreement under which an interest or an encumbrance is retained by the seller or otherwise imposed by the Contractor or such other person.
- E. Unless otherwise provided in the Contract Documents, payments may be made, within the sole discretion of the County, on account of materials or equipment not incorporated in the Work but delivered and suitably stored at the Project site and, if approved in advance by the County, payments may similarly be made for materials or equipment suitably stored at some other location agreed upon in writing. Applications for payment must differentiate between materials stored on site and materials stored off site. Payments for materials or equipment stored on or off the Project site shall be allowed only at the sole discretion of the County and shall be conditioned upon submission by the Contractor of a detailed description of all such materials and equipment and of bills of sale or such other procedures satisfactory to the County to establish the County's title to such materials or equipment or otherwise protect the County's interest, including applicable insurance and transportation to the Project site for those materials and equipment stored off the Project site. In addition, as a further condition precedent to payment for stored materials, Contractor shall:
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
  2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  3. Provide summary documentation for stored materials indicating the following:
    - a. Value of materials previously stored and remaining stored as of date of previous applications for payment.
    - b. Value of previously stored materials put in place after date of previous application for payment and on or before date of current application for payment.
    - c. Value of materials stored since date of previous application for payment and remaining stored as of date of current application for payment.

Contractor must complete specific considerations and comply with the requirements of the Contract Documents before purchasing any materials ahead of their scheduled installation. While there are clearly recognized benefits to both the Owner and Contractor for purchasing materials early, there is also increased risk and additional work required to protect those purchases and track them appropriately. It is Contractor's responsibility for the risk management of stored items and security that includes warranty protections. Purchasing of items must be approved by Owner's Representative prior to ordering materials to be delivered.

The County will only consider ahead-of-schedule material purchases under the following conditions:

1. Contractor provides supporting documentation (narrative) demonstrating valid reason or cause (such as long lead time, material or manufacturing shortages, tariffs, etc.)
2. Approved items have been inventoried by the Construction Administrator or Owner's Representative
3. Materials are stored in a safe and weather protected manner
4. Stored materials will be available for periodic inspections by Construction Administrator or Owner's Representative
  - a. If inspection is requested by County, Contractor shall reimburse Owner's Representative, Construction Administrator or Project Inspector for transportation, per diem and wages if out-of-town travel is required to reach storage location for inspection.
5. Stored materials have a required jobsite availability date clearly established in the project construction schedule.

The County will not consider payment for stored materials that are:

1. Not itemized
2. Raw materials or any items that are not ready for immediate installation at jobsite
3. Items that are not documented in the construction schedule
4. Items that are greater than 10% of the overall contract or 15% of current progress payment
5. Long lead items greater than 8 weeks

Additional requirements for stored materials:

1. Requests for storing materials offsite must be made at least 14 days prior to submission of pay application
2. Only bonded subcontractors and vendors will be considered for storage. Bonded subcontractors and vendors must show bonding documents that show County as assignee
3. Materials stored, but not requesting payment must be stored in a bonded facility unless in transit
4. Materials stored at the manufacturing facility will not be paid in advance unless it can be proven to be physically segregated from the rest of the facility. Materials stored at the manufacturing facility must be labeled with job identification, fenced off, shrink-wrapped or otherwise securely separated from regular inventory, to County's satisfaction.
5. Access and delivery of goods must be able to be cleared for release by Contractor in the event of a subcontractor/vendor failure to perform or replacement
6. Manufacturer warranty periods must be extended for the full duration that the materials are in storage

Contractor will keep an inventory log of stored materials offsite as well as onsite (yet to be installed) and submit with each upcoming progress payment funding request.

The inventory log must include the following:

- Description – that includes storage disposition and subcontractor/vendor responsibility information
- Onsite Previously Billed – quantities and values
- Onsite Previously Billed Now in Place – quantities and values
- Onsite Billed This Period – quantities and values
- Offsite Previously Billed – quantities and values

- Offsite Previously Billed Now in Place – quantities and values
- Offsite Billed This Period – quantities and values
- Total Currently Stored Onsite – values
- Total Currently Stored Offsite - values

Supporting documents to be submitted for approval fourteen (14) days prior to approval

- Subcontractor/vendor provides copies of insurance/bonding certification documents for storage location during the time of storage and naming the County as additional insured
- Subcontractor/vendor provides evidence of insurance coverage during transportation of stored materials and naming the County as additional insured
- Subcontractor/vendor provides letter accepting responsibility for any deductibles placed on those specific stored materials
- Copies of invoices/bill of sale
- Copy of log stored materials with updated disposition of materials stored status that includes locations, bonding information, dates of insurance certificate coverage periods, etc.
- Photographic evidence of stored materials in the conditions in which they are stored and with identifiable markings on them indicating invoice/bill of sale relationship. Packing slips do not contain enough information to identify specific materials with job orders
- Evidentiary photos must be labeled with a description of the materials and the date pictures were taken.

- F. Acceptance of any work and payments therefore shall be made upon written recommendation of the Owner's Representative and Architect.
- G. Payments to the Contractor will be made within 30 days of receipt of an undisputed and properly submitted application for payment in accordance with Owner's regular approval and accounting procedures, based upon statements or certificates received as issued or approved by the Owner's Representative, including written certification that complete certified payroll records have been, or will be, submitted to the Labor Commissioner as required by the California Labor Code.
- H. The Contractor shall promptly pay each subcontractor upon receipt of payment from the County, out of the amount paid to the Contractor on account of such subcontractor's work, the amount to which subcontractor is entitled, reflecting the percentage actually retained, if any, from payments to the Contractor on account of such subcontractor's work. The Contractor shall, by an appropriate written agreement with each subcontractor, require each subcontractor to make payments to their sub-subcontractors in similar manner.
- I. Neither certification of a progress payment, delivery of a progress payment, nor partial or entire use or occupancy of the Project by the County, shall constitute an acceptance of any work not in accordance with the Contract Documents, nor shall it be deemed a waiver of County of any remedy it may have in law or equity.
- J. The County may withhold any payment in whole or in part to the extent necessary to reasonably protect the County, if it is unable to verify the accuracy of an application for payment. If the County is unable to verify the accuracy of an application for payment, the County will notify the Contractor in writing. If the Contractor and the County cannot agree on a revised amount, the County will promptly process payment for those amounts for which it is able to verify. The County may also withhold any payment, or portion thereof, to protect the County from loss because of subsequently discovered:
- (i) Defective work not remedied;
  - (ii) Third party claims filed or reasonable evidence indicating probable filing of such claims, including claims by separate contractors;



- (iii) Failure of the Contractor to make payments properly to subcontractors, or for labor, materials or equipment;
- (iv) Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Price;
- (v) Damage to the County or another contractor;
- (vi) Reasonable evidence that the Work will not be accomplished in compliance with the Contract Time;
- (vii) Failure to carry out the Work in accordance with the Contract Documents, including, without limitation, the failure to make required submittals;
- (viii) Stop notice(s) served upon the County;
- (ix) Failure to submit certified weekly payrolls;
- (x) Failure or refusal of Contractor to comply with the Contract Documents, including the failure of the Contractor to provide any required warranty/maintenance bond; and
- (xi) Any other material breach of the Contract Documents by Contractor and/or its subcontractors or suppliers of any tier.

When the grounds above are removed, payment shall be made by County for amounts withheld because of them within 30 days thereafter.

Should Stop Notices be filed with the Owner, Owner shall in accordance with California Civil Code Section 9358, withhold the amount claimed, plus an allowance of 25% to cover its litigation costs plus interest at the rate of 10%, from certificates until such claims have been resolved pursuant to law.

- K. Subject to and in accordance with the requirements of California law (including Public Contract Code section 7201) and the Contract Documents, the County shall hold retainage from the Contractor. The Contractor, or its subcontractors, shall return all monies withheld in retention from a subcontractor within the time periods authorized under California law after receiving payment for work satisfactorily completed and accepted including incremental acceptances of portions of the contract work. Any violation of this provision shall subject Contractor, or its subcontractors, to the penalties, sanctions and other remedies specified under California law. These requirements shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise available to County or the Contractor, or its subcontractors, in the event of a dispute involving late payment or nonpayment by Contractor, deficient subcontract performance, or noncompliance by a subcontractor. This provision applies to both DBE and non-DBE contractors and subcontractors.

Pursuant to Section 22300 of the California Public Contract Code, the Contractor may elect to substitute securities for any monies withheld by the County to ensure performance under the Contract Documents. At the request and expense of the Contractor, securities equivalent to the amount withheld shall be deposited with the County, or with a state or federally chartered bank as the escrow agent, who shall then pay such monies to the Contractor. Upon satisfactory completion of the requirements of the Contract Documents, the securities will be returned to the Contractor. Such securities, if deposited by the Contractor, shall be valued by the County, whose decision on valuation of the securities shall be final. Securities eligible for investment under this provision shall be limited to those listed in Section 22300 of the Public Contract Code.

- L. Contractor, and its subcontractors, shall pay any subcontractor not later than seven (7) calendar days of receipt of each progress payment in accordance with the provision in section 7108.5 of the

California Business and Professions Code concerning prompt payment to subcontractors. Any violation of section 7108.5 shall subject the violating contractor or subcontractor to the penalties, sanction and other remedies of that section. This requirement shall not be construed to limit or impair any contractual, administrative, or judicial remedies otherwise available to County or the Contractor, or its subcontractors, in the event of a dispute involving late payment or nonpayment by the Contractor, deficient subcontract performance, or noncompliance by a subcontractor. This provision applies to both DBE and non-DBE subcontractors.

- M. When the Work is ready for acceptance by the County, the Owner's Representative will confirm whether the Work has reached Substantial Completion and will prepare a list of items to be complete or corrected. The failure to include any item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.
- N. Upon final completion of all work and Final Acceptance by the Board of Supervisors, with the contract requirements having been fully and completely satisfied including, without limitation:
1. Acceptance of the work by the Owner's Representative and Architect
  2. The Contractor providing to the County all documents and information required by the Contract Documents including, without limitation:
    - a. All releases
    - b. Maintenance guarantees
    - c. Maintenance manuals and technical specifications
    - d. All requirements for Contract Closeout including as set forth Section 01 77 00 herein

And Thirty-five (35) days after recordation by the County of a Notice of Completion with the County Recorder following Board of Supervisor's Acceptance:

1. All claims for labor and materials have been paid
2. No claims shall have been filed with the County based upon acts or omissions of the Contractor
3. No stop notices have been filed

The Contractor shall be entitled to the balance due for the completion and acceptance of the Work, less sums withheld for liquidated damages, if any, or any other damages incurred by the County or other sums withheld pursuant to the terms of the Contract Documents or by law.

- O. The making of final payment shall not constitute a waiver of any claims by the County.
- P. Subject to the terms of the Contract Documents, the acceptance of final payment shall, after the date of Substantial Completion of the Project, constitute a waiver of all Claims by the Contractor.
- Q. All provisions of this Agreement, including without limitation those establishing obligations and procedures, shall remain in full force and effect notwithstanding the making or acceptance of final payment.
- R. Final payment will be made in accordance with the Contract Documents and California law, including, without limitation, Public Contract Code § 7107.
- S. Pursuant to Public Contract Code § 7107, in the event of a dispute between the County and Contractor, the County may withhold from the final payment an amount not to exceed 150 percent of the disputed amount.

**GC 11. CONFLICTS OR ERRORS**

- A. During construction, if any conflicts are discovered in the Plans or Specifications, they shall be immediately submitted to the Owner's Representative who will render an interpretation on what was intended and the Contractor agrees to furnish all things necessary by such interpretation to the satisfaction of the Owner's Representative without additional expense to the Owner.

- B. The Contractor shall not contend that any error, delay or default in its work is due to omission or ambiguity in said plans or specifications.
- C. If errors are found in the Contract Documents that cannot be termed conflicts, the Contractor shall immediately notify the Owner's Representative no later than 10 calendar days following the discovery of any such error.
- D. Refer to G.C. 24, Unity of Documents.

**GC 12. CHANGES IN THE WORK**

- A. No modification or deviation from Plans and Specifications will be permitted by the Contractor without prior written consent of Owner. However, Owner, without invalidating the Contract, and with or without notice to Contractor's surety, may order extra work or make changes by altering, adding to, or deducting from the Work, Changes in the work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order or Field Order subject to the limitations stated herein.
- B. A Change Order shall be based upon agreement between the Owner and Contractor; a Field Order may or may not be agreed to by the Contractor.

Changes in the work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order or Field Order. Contractor agrees that any claims for extra costs for equipment shall be determined by the rates set forth in the California Department of Transportation's equipment rental rate book. Contractor shall provide notice and documentation of such daily equipment costs together with daily time and material tags within seven (7) days of incurring such costs under a Field Order. Contractor's failure to comply with the requirements of this section shall constitute a waiver of any extra equipment cost claims.

- C. The credit to or charge against the Owner shall be determined as follows:
  1. In the event that a modification results in a reduction of the amount of labor and material to be supplied by the Contractor, the Owner shall be given a credit equal to the actual value of such labor and materials plus a reasonable amount for the use of tools, materials and reasonable overhead and profit as set forth below;
  2. In the event a modification results in an increase in the amount of labor and materials to be supplied by the Contractor, the Owner shall pay the Contractor the actual value of such labor, materials and equipment plus reasonable overhead and profit as set forth below. All costs shall be included as a lump sum price on change orders.
  3. The Contractor agrees that its reasonable overhead and profit on modifications to the work shall not exceed the values in the following table:

<b>Overhead and Profit Markup for Modifications to Work</b>		
<b>Modified Raw Cost of Materials and Labor</b>	<b>Work is Self-performed by General Contractor (GC)</b>	<b>Work is Subcontracted</b>
\$1 - \$1,000	20% to GC	10% to Subcontractor 10% to GC
\$1,001 - \$15,000	15% to GC	10% to Subcontractor 5% to GC
\$15,001 - \$30,000	12% to GC	10% to Subcontractor 4% to GC
\$30,001 - up	10% to GC	10% to Subcontractor 2% to GC

2. Cost Proposals for all changes shall be submitted by the Contractor to the Construction Administrator for review by the Owner's Representative and Architect. The Contractor shall submit all Cost Proposals within 15 calendar days following the discovery of any potential change. The Owner's Representative shall render a written decision as to reasonable costs within 15 calendar days of receiving cost proposal unless more time is agreed to by both Contractor and Owner's Representative.
  3. Any increases in cost or extension of time shall be approved by the Owner's Representative, Architect and Owner, on a signed change order.
  4. In the event that the Contractor, for whatever reason, does not accept the dollar amount of increase or decrease or extension of time to the contract amount in the decisions rendered by the Owner, Contractor shall, upon receiving written Field Order from the Owner, proceed with the work called for in the Cost Proposal on a force account basis. Any claim for dollar increases or extension of time shall be made in writing to the Owner's Representative in accordance with the provisions of GC 51, Claims Procedures.
- D. In response to a request for a proposed modification, Contractor shall promptly furnish within 15 calendar days, relevant cost breakdowns, time estimates and other information as may be required to the Owner's Representative.
- E. A Change Order is a written instrument prepared by the Owner's Representative, recommended by the Architect and signed by the Owner and Contractor stating their agreement upon all of the following:
1. The change in the work;
  2. The amount of the adjustment, if any, in the Contract Price; and
  3. The extent of the adjustment, if any, in the Contract Time.

Eliminated Items - The Owner reserves the right to eliminate any contract item of work prior to the award of the Agreement without incurring any obligation to pay therefor. Should any contract item of the Work be eliminated in its entirety following the award of the Agreement and in the absence of an executed Change Order covering such elimination, payment will be made to the Contractor for reasonable costs actually incurred, and which are validated by Owner as being incurred, in connection with such eliminated contract item if incurred prior to the date of notification in writing by the Owner of such elimination.

An executed Change Order shall constitute a final settlement of all matters relating to the change in the work which is the subject of the Change Order, including, but not limited to, all direct and indirect costs associated with such change, any adjustments to the Contract Price, and any and all adjustments to the Schedule or Contract Time.

- F. A Field Order is a written order prepared by the Owner's Representative and signed by the Owner, directing a change in the work prior to agreement on adjustment, if any, in the Contract Price or Contract Time, or both. The Owner may by Field Order, without invalidating the Contract, order changes in the work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Price and Contract Time being adjusted accordingly.

To the extent Owner refuses to issue a change order for such work or the Owner and Contractor cannot agree on the cost or credit or time for the changed work, Contractor shall nevertheless perform that work as expeditiously and timely as possible and shall submit a complete and specific claim for additional compensation or extension of the time for performance within ten (10) days after such work is performed. For each day any extra work is performed, Contractor shall identify the same in the daily report in a format as required by Owner, and Contractor shall complete, sign and deliver to Owner a specific daily extra work form detailing the actual extra work performed. Contractor's failure to provide written notice of claim prior to undertaking such work, or failure to submit timely the daily report, the daily extra work report, and a complete and specific claim for additional compensation or extension of the time for performance, shall be

deemed a waiver and abandonment of any such claim. No claim, dispute or controversy shall interfere with the progress or performance of the work.

G. A Field Order shall be used in the absence of total agreement on the terms of a Change Order.

If the Field Order provides for an adjustment to the Contract Price, the adjustment shall be based on one of the following methods:

1. Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
2. Unit prices stated in the Contract Documents or subsequently agreed upon;
3. Cost to be determined in a manner agreed upon by the Owner and Contractor and a mutually acceptable fixed or percentage fee; or
4. As provided in Subsection I below.

H. A Field Order signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Price and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

I. If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Price, the Owner's Representative shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the work attributable to the change, including, in case of an increase in the Contract Price, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Subsection H above, the Contractor shall keep and present, in such form as the Owner's Representative may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this section shall be limited to the following:

1. Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
2. Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
3. Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
4. Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the work; and
5. Additional costs of supervision and field office personnel directly attributable to the change.

J. The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Price shall be actual net cost as calculated in paragraph C above and confirmed by the Owner's Representative. When both additions and credits covering related work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

K. Pending final determination of the total cost of a Field Order to the Owner, the Contractor may request payment for work completed under the Field Order in Applications for Payment. The Owner's Representative will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Owner's Representative determines, in the Owner's Representative's professional judgment, to be reasonably justified. The Owner's Representative's interim determination of cost shall adjust the Contract Price on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Articles 15 and 51.

L. When the Owner and Contractor agree with a determination made by the Owner's Representative concerning the adjustments in the Contract Price and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the

Owner's Representative will prepare a Change Order. Change Orders may be issued for all or any part of a Field Order. Failure of the Contractor to notify the Owner of any disagreement with any proposed adjustment to the Contract Price, Schedule and/or Contract Time, as applicable, or method for determining them set forth in a Field Order within seven (7) days after the date of receipt by the Contractor of such Field Order shall be deemed to be an agreement by the Contractor to the proposed adjustment to the Contract Price, Schedule and/or adjustment to the Contract Time, as applicable, or method for determining them set forth in such Field Order, and shall constitute a waiver by Contractor of any claims related thereto.

GC 13. GUARANTEE

- A. The Contractor shall be held responsible to make-good any defects due to faulty, improper or inferior workmanship or materials arising or discovered in any part of the Work within one (1) year after the completion and final acceptance of the same by the Owner's Representative, Architect and Owner unless a longer period is called for in the Technical Specification Sections. Any and all guarantee periods, one year or otherwise, do not in any way limit or waive the County's rights to pursue legal action for patent or latent construction defects in accordance with California Code of Civil Procedure sections 337.1 and/or 337.15.
- B. In the event of failure of Contractor to comply with the requirements of any guarantee by this Contract, including without limitation the guarantee(s) provided by this section, within seven (7) days after being notified in writing, Owner is authorized to proceed to have the defects repaired and made good at the expense of Contractor, who shall pay the costs and charges therefore immediately on demand.
- C. Acceptance of the Work by the Owner's Representative, Architect or Owner shall in no way absolve the Contractor from the responsibility of complying with the provisions of the Plans and Specifications and other contract documents, even though deviations may not be discovered within the aforementioned one year period.
- D. The bond for faithful performance furnished by the Contractor shall cover such defects and protect the Owner against them and remain in force during the one year guarantee period.

GC 14. INTERPRETATIONS

- A. The Contractor shall comply with the obvious intent and meaning of the Plans and Specifications which shall be construed to include all material, measures and modes or work necessary to complete the work required in a workmanlike manner, in strict accordance with these Plans and Specifications, and to the satisfaction of the Owner.
- B. Should any question arise as to the intent and interpretation of the Plans or Specifications, the Contractor shall promptly, upon discovery thereof, refer the same in writing to the Owner's Representative, whose decision thereon shall be final.

GC 15. DECISIONS BY ARCHITECT AND/OR OWNER'S REPRESENTATIVE

- A. The Owner's Representative shall, in all cases, determine whether the amount and quality of the several kinds of work which are to be paid for under the Contract are in accordance with the Plans and Specifications.
- B. The Owner's Representative shall have power to cause all or any part of the Work to be expedited with greater diligence when delayed or stopped.
- C. When requested by the Owner's Representative, the Architect's decisions in matters relating to artistic effect will be final if consistent with the intent of the Contract Documents.
- D. Where not involving a change in the agreed Contract Price or Contract Time, and not inconsistent with the intent of the Contract Documents, the Owner's Representative shall have authority to:

1. Correct any errors or inconsistencies in, and make any deletions from or additions to the drawings and specifications;
  2. Order minor changes or adjustments in the work, whether by field order, notations on Contractor's submittals, or other instructions;
  3. Order certain portions of the work delayed when particularly involved with or affected by any Change Order in process or being considered by Owner.
- E. The Owner's Representative will be the interpreter of the requirements of the Contract Documents and the judge of the performance thereunder by both the Owner and Contractor.
- F. The Architect, when requested by the Owner's Representative, will render interpretations necessary for the proper execution or progress of the Work, with reasonable promptness and within fifteen (15) calendar days.
- G. Claims, disputes and other matters in question between the Contractor and the Owner relating to the execution or progress of the Work or the interpretation of the Contract Documents shall be referred to the Owner's Representative for decision which the Owner's Representative will render in writing with a reasonable promptness and within fifteen (15) calendar days. In the absence of a written decision by Owner's Representative, said claims, disputes and other matters shall be deemed denied or rejected.

GC 16. ADMINISTRATION OF THE CONTRACT

- A. The Construction Administrator will provide administration of the Contract. Maintenance of the Project records for the Contract shall be as prescribed by the Owner's Representative and as hereinafter described.
- B. The Owner's Representative will be the representative of the Owner during construction and until final payment is due. The Architect will advise and consult with the Owner's Representative and Owner. The Owner's instruction to the Contractor shall be forwarded through the Construction Administrator. The Construction Administrator will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified by written instrument.
- C. The Construction Administrator, Owner's Representative, Project Inspector or Architect will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, and will not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The Construction Administrator, Owner's Representative, Project Inspector or Architect will not be responsible for or have control over acts or omissions of the Contractor, subcontractors, or any of their agents or employees, or any other persons performing any of the Work.
- D. The Construction Administrator, Project Inspector, Owner's Representative and Architect shall at all times have access to the Work wherever it is in preparation and progress. The Contractor shall provide facilities for such access so the Construction Administrator, Project Inspector, Owner's Representative and Architect may perform their functions under the Contract Documents.
- E. Based on the Construction Administrator, Project Inspector, Owner's Representative and Architect's observations and an evaluation of the Contractor's applications for payment, the Owner's Representative will determine the amounts owing to the Contractor and will issue Certificates for Payment in such amounts as provided in GC Article 10.
- F. The Construction Administrator shall, upon receipt of a complete submittal from the Contractor, make the submission to the Architect. The Architect shall review and take appropriate action on shop drawings, product data, samples, and other submittals required by the Contract Documents. Such review shall be only for general conformance with the design concept and general compliance

with the information given in the Contract Documents. It shall not include review of quantities, dimensions, weights or gauges, fabrication processes, construction methods, coordination with the work of other trades, or construction safety precautions, all of which are the sole responsibility of the Contractor. The Architect's review shall be conducted with reasonable promptness, and within 21 calendar days unless otherwise noted, consistent with sound professional practice. Review of a specific item shall not indicate acceptance of an assembly of which the item is a component. The Architect shall not be required to review and shall not be responsible for any deviations from the Contract Documents not clearly noted by the Contractor, nor shall the Architect be required to review partial submissions or those for which submissions for correlated items have not been received.

- G. The Owner's Representative will prepare Change Orders in accordance with GC Article 12.
- H. The Contractor shall provide sufficient, safe and proper facilities at all times for the full inspection of the Work by the Architect or other representatives of the Owner, at the Project site and at the various other locations where the Project is being performed.
- I. The Owner's Representative, Project Inspector and Architect will have authority to reject work which does not conform to the Contract Documents. Whenever, in their opinion, the Owner's Representative, Project Inspector and Architect considers it necessary or advisable for the implementation of the intent of the Contract Documents, the Owner's Representative, Project Inspector or Architect will have authority to require special inspection or testing of the Work in accordance with GC Article 31, whether or not such work be then fabricated, installed or completed. However, the Owner's Representative, Project Inspector and Architect's authority to act under this Subparagraph and any decision made by them in good faith to exercise or not to exercise such authority, shall not give rise to any duty or responsibility of the Owner's Representative, Project Inspector or Architect to the Contractor, and subcontractor, any of their agents or employees, or any other person performing any the Work.
- J. The duties, responsibilities and limitations of authority of the Owner's Representative as the representative of the Owner during construction as set forth in the Contract Documents will not be modified or extended without written consent of the Owner.

**GC 17. NON-CONFORMING WORK**

- A. The fact that the work and materials have been inspected from time to time and payments on account have been made, shall not relieve the Contractor from the responsibility of replacing and making good any defective work or materials that may be discovered after the date of completion of the Work by the Contractor and its approval by the Owner's Representative, Architect, and its acceptance by the Owner.
- B. Failure of Owner's Representative, Architect or Owner to object to any defects in work or material or variances from the Plans and Specifications during or after construction shall not be deemed a waiver by Owner, Owner's Representative or Architect of such defects or variances; nor by such failure shall Owner, Owner's Representative or Architect be deemed stopped from requiring Contractor to correct such defects or variances.
- C. At Owner's sole option, if Owner prefers to accept non-conforming work, Owner may do so instead of requiring its removal and correction, in which case a Change Order will be issued to reflect an appropriate reduction in the Contract Price, or if the amount is determined after final payment it shall be paid by the Contractor.
- D. Uncovering of Work:
  - 1. If any portion of the Work should be covered contrary to the request of the Owner's Representative, Project Inspector or Architect, or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the Owner's Representative, be uncovered for their observation and shall be replaced at the Contractor's expense.



2. If any other portion of the Work has been covered which the Owner's Representative, Project Inspector or Architect has not specifically requested to observe prior to being covered, the Owner's Representative, Project Inspector or Architect may request to see such work and it shall be uncovered by the Contractor. If such work be found in accordance with the Contract Documents, the cost of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such work be found not in accordance with the Contract Documents, the Contractor shall pay such costs unless it be found that this condition was caused by the Owner or a separate contractor as provided in GC 8 above, in which event the Owner shall be responsible for the payment of such costs.
- E. The County's rights as set forth in this section are without prejudice to any other right or remedy the County may have under the Contract Documents or by law, including without limitation, under GC 5.

**GC 18. OWNERSHIP OF DOCUMENTS**

- A. All Plans and Specifications shall remain the property of the Owner and shall be returned to the Owner's Representative or shall be accounted for by the Contractor before the final acceptance of building by the Owner.
- B. Documents for this Project shall not be used on or for any other work or purposes without express written consent of Owner's Representative, Architect and Owner.

**GC 19. DOCUMENTS FURNISHED**

- A. If requested, the Contractor will be supplied five (5) sets of Contract Documents for use in the work.
- B. Additional sets of Contract Documents may be obtained from the County, at cost, at Contractor's expense.

**GC 20. DRAWING DIMENSIONS**

- A. The general dimensions are shown in figures on the drawings furnished to the Contractor. These figured dimensions shall invariably have preference to scaled measurements; but the Contractor shall exercise proper caution and care to verify the figures before laying out the Work, and shall be held responsible for any omissions or errors therein that might have been avoided.

**GC 21. DETAILED DRAWINGS**

- A. Drawings and details may be furnished to the Contractor as work progresses, showing in more elaboration the work intended to be done and the Contractor shall conform to them as being a part of the Contract.
- B. No work shall be performed in advance of the receipt by the Contractor of such detailed drawings, except such work as the Owner's Representative shall order in writing to be done without details. Any complaint as to the character and extent of the details shall be made to the Owner's Representative within ten days after the Contractor has received the same. The Contractor shall notify the Owner's Representative in ample time as to when the Contractor will require these drawings so they may be prepared without causing any delay to the Work.

**GC 22. SUBMITTALS**

- A. Shop Drawings are drawings, diagrams, schedules, coordination drawings, setting drawings and other data specially prepared for the Work by the Contractor or any subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

- B. Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate a material, product or system for some portion of the Work.
- C. Samples are physical examples which illustrate materials equipment or workmanship and establish standards by which the Work will be judged.
- D. The Contractor shall review, approve and submit, with such promptness as to cause no delay in its own work or in that of any other contractor, copies of all Shop Drawings, schedules for the work of the various trades and samples of materials and finishes required for the Work, together with information or supporting data as may be required or called for. The Owner's Representative will pass upon them with reasonable promptness in accordance with GC Article 16. The Contractor shall make any corrections required by the Owner's Representative or Architect and resubmit corrected copies to Owner's Representative or Architect for further review.
- E. Samples required or called for shall be exactly as specified for and intended to be used in the work; and Shop Drawings shall accurately portray the work required. Materials, finishes and workmanship shall be equal in every respect to that of the reviewed submittals.
- F. Submittals shall be delivered to, and as directed by, the Construction Administrator, postage or delivery charges prepaid by the Contractor in all cases. Samples returned upon request from the Contractor shall be returned by collect mail, parcel post or any carrier named by Contractor.
- G. The furnishing by the Contractor for the review by the Architect of drawings, samples, schedules or other data shall not relieve the Contractor from responsibility for deviations from drawings or specifications, nor shall it relieve it of responsibility for errors of any sort in shop drawings, schedules or other submittals.
- H. By approving and submitting Shop Drawings, Product Data and Samples, the Contractor represents that it has determined and verified all materials, field measurements, and field construction criteria related thereto, or will do so, and that it has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.
- I. Each Submittal shall be properly identified as required by the Construction Administrator.
- J. Deviations from requirements of Contract Documents, errors, inconsistencies with submittals previously made to or reviewed by Architect, and corrections to dimensions or supporting data shall be clearly identified by the Contractor by notations on the submittals or attached explanations.
- K. No portion of the Work requiring submission of a Shop Drawing, Product Data or Sample shall be commenced until the submittal has been reviewed by the Architect as provided in Subparagraph F of GC Article 16. All such portions of the Work shall be in accordance with reviewed submittals.

**GC 23. SURVEY AND LAYOUT**

- A. All work pertaining to this Contract shall be laid out on the premises by the Contractor who shall be held responsible for its correctness.
- B. The Contractor shall retain and pay for the services of a registered engineer or licensed surveyor, when required by the Plans and Specifications, or when applicable to ensure work is properly laid out, who shall lay out the main lines of the building and other improvements at the site and provide other primary lines, pile locations and levels as may be required.
- C. All stakes, benchmarks, survey marks, monuments and other line or level points which have been or may be established in the building or on or about the premises shall be carefully preserved and respected by the Contractor.

- D. On-site work shall be laid out to properly meet existing off-site work not required to be removed or replaced, or to lines and levels established by civil authorities having jurisdiction, as applicable to conditions at the place of the Work.

**GC 24. UNITY OF DOCUMENTS**

- A. The Plans and Specifications are one document and any work shown, required or called for in the one and not in the other, or vice versa, shall be furnished or performed as though it were shown, required or called for in both.
- B. The Contractor admits and agrees that the Contract Documents exhibit the intent and purpose of the Owner in regard to the Work, and that they are not complete in every detail and are to be considered as showing the purpose and intent only; and Contractor further agrees to furnish all labor or material for any detail that is necessary to carry out said intent and purpose without extra charge to the Owner.
- C. The misplacement, addition or omission of any word, letter or punctuation mark shall in no way change the intent, purpose of meaning or the Plans and Specifications.
- D. Any part of the Work or any article or detail pertaining thereto which is not specifically set forth in the Specifications or shown on the Drawings, but which is necessary for the proper completion of the Work, shall be furnished and installed at the Contractor's expense the same as if it had been partly or fully shown or specified. The Contractor shall do and furnish all things necessary to make a complete and workmanlike job in accordance with the intent and purpose of the Contract Documents.

**GC 25. INSPECTION BY CONTRACTOR**

- A. The Contractor shall inspect, review, compare and familiarize himself with the Contract Documents and the premises of the Work, and shall at once report to the Architect and Owner's Representative, in writing, any error, omission or inconsistency within the documents or between information given and conditions observed or found at the premises.
- B. The Contractor shall make a close inspection of all materials as delivered, and shall promptly return all damaged or defective materials without waiting for their rejection by the Owner's Representative, Project Inspector, or Architect.
- C. Before beginning any of the Work, the Contractor shall examine all construction and work of other contractors or trades that may affect this work, and to satisfy that everything is in proper condition to receive this work; and shall at once notify the Construction Administrator and Owner's Representative in writing of any exception taken to any construction or condition so affecting this work, whether placed under this Contract or other contracts.
- D. Failure to file with the Construction Administrator and Owner's Representative any notice to the contrary shall constitute acceptance by the Contractor of the construction of other contractors or trades as being suitable in all ways to receive its work, except as to defects which later develop in the work of other contractors after the execution of its own work.
- E. Contractor's inspection of documents and premises shall include making known to itself the general and particular location, nature and character of the Project work, the physical and contractual conditions, provisions and requirements, the nature and extent of work and equipment to be furnished by Owner, and the limitations and various other aspects relative to this Project, including all coordination necessary for proper and timely execution of the Work.

- F. Owner will not consider any claims whatsoever on account of Contractor's failure to fully investigate or determine the requirements of the Work in advance of commencing the Work or the conditions of the Work throughout its progress.

**GC 26. DEVIATION FROM PLANS OR SPECIFICATIONS**

- A. No deviations shall be made from the Plans or the Specifications. If the Contractor shall vary from the plans the amount or value of the materials herein provided for, the Owner shall have the right to order such improper work or materials removed or replaced; any other work disturbed or damaged by such alteration shall be made good at the Contractor's expense.

**GC 27. STANDARDS OF MATERIALS**

- A. Wherever the name or brand of a manufacturer's article is specified herein, it is used as a measure of quality and utility; a standard.
- B. If the Contractor desires to use any other brand or manufacturer of equal quality and utility to that specified, Contractor shall make application to the Owner's Representative in writing, and submit samples if requested. Refer to Section 00 21 13, "Instructions To Bidders" for substitution request procedures.

**GC 28. QUALITY OF MATERIALS AND LABOR**

- A. All materials used on this Contract shall be new and the best market quality unless specified or shown otherwise. All labor used on this Contract shall be competent and skilled for the Work. All work executed under this Contract shall be done in the best, most thorough, substantial and workmanlike manner. All material and labor shall be subject to the approval of the Architect as to its quality and fitness, and shall be immediately removed if it does not meet with approval. The Owner's Representative may refuse to issue a Certificate of Payment for unapproved work until all defective materials or work have been removed and other material of proper quality substituted therefore.

**GC 29. DELIVERY AND STORAGE OF MATERIALS**

In addition to all other requirements of the Contract Documents, including without limitation the construction progress schedule, Contractor shall comply with the following with respect to materials:

- A. Contractor shall deliver all manufactured materials in the original packages, containers or bundles (with the seals intact) bearing the name or identification mark of all manufacturers.
- B. Contractor shall deliver fabrications in as large assemblies as practicable and where specified to be shop-primed or shop-finished, they shall be packaged or crated as required to preserve such priming or finish intact and free from abrasion.
- C. Contractor shall store all materials in such manner as necessary to properly protect them from damage. Materials or equipment damaged by handling, weather, dirt, or from any other cause will not be accepted. Contractor must replace or repair to as new condition any damaged materials or equipment.
- D. Contractor shall store materials so as to cause no obstructions. Materials shall be stored off sidewalks, roadways, and underground services. The Contractor shall be responsible for protecting all material and equipment furnished under the Contract.
- E. All materials stored off site for which Contractor seeks payment are subject to the requirements of GC 10, Terms of Payment. Contractor shall provide a detailed description of all such materials in a form and substance as required by County in its sole discretion as a condition precedent for payment for those materials.

GC 30. OLD MATERIAL

- A. Old material shall not be used.
- B. Construction materials or other items used or placed in the Work later shall be considered old materials and not reused.

GC 31. TESTS

- A. Contractor shall comply with the requirements set forth in Division 01, General Requirements Sections and those set forth in the construction documents.
- B. If Contractor's performance of the work requires excess testing and inspection costs to the County, Contractor shall be responsible for, and pay to the Owner through deductive change order, costs of testing or inspection attributable to the following:
  - 1. Retesting due to failure of initial samples.
  - 2. Additional costs due to overtime work or extra shifts work because of improper scheduling of work or of delivery of materials by Contractor.
  - 3. Failure to properly notify laboratory or inspector.
  - 4. Changes in sources, lots or suppliers of materials after original tests.
  - 5. Changes in methods or materials of construction requested by Contractor that require testing, inspection, or other related services in excess of that required by original design.
  - 6. Concrete mix designs in excess of first successful design for each concrete type.
  - 7. Overtime or extra shift work requiring overtime work by Owner's Inspector.

GC 32. PATENT RIGHTS, COPYRIGHTS, TRADE NAMES AND ROYALTIES

- A. The Contractor shall indemnify and save harmless the Owner and authorized persons acting for the Owner against all liability on account of any patent rights, copyrights or trade names which may affect the articles or materials or their application under the Contract.
- B. The Contractor shall pay all royalties or other charges that may arise due to methods, types of construction, processes, materials or use of equipment and shall hold the Owner harmless from any claims or charges whatsoever which may arise; and shall furnish written assurance satisfactory to the Owner that such charges have been paid.

GC 33. COMPLIANCE WITH ALL LAWS

- A. The Contractor shall conform to and abide by all applicable city, county, regional, state and federal building, labor, sanitary, health and safety laws, ordinances, rules and regulations as currently adopted or enforced, including Part 1 & 2 of Title 24, Calif. Code of Regulation and the International Building Code, International Fire Code, latest edition; Uniform Mechanical Code, latest edition; National Electrical Code, latest edition;; and the Uniform Plumbing Code, latest edition. The Project shall also comply with the Americans with Disabilities Act, and the latest editions of associated regulations; a copy of Title 24, CCR and the current California Building Code shall be made available at the job site at all times by the Contractor. Such laws and regulations shall be considered a part of the Contract Documents the same as if set forth herein full, and all work hereunder shall be executed in accordance therewith.
- B. All work and materials shall be in full accordance with the latest rules and regulations of the State Fire Marshal, the Safety Orders of the Division of Industrial Safety, the National Electric Code, the Uniform Plumbing & Mechanical Codes published by the International Association of Plumbing and Mechanical Officials, and other applicable state laws or regulation including all of Title 24, Calif. Code of Regulation. Nothing in these plans or specifications is to be construed to permit work not conforming to these codes.

- C. The Contractor shall be familiar with the various Federal, State and Local laws affecting public work, especially, but not limited to, those laws relating to hours of employment, minimum wage rates, payment of wages, sanitary and safety conditions for workmen, workmen's compensation insurance, type and kind of materials that can be used, non-discrimination in employment and affirmative-action programs. Contractor is advised that this is a Public Project which may be paid for, in whole or in part, by Federal, State and/or local funds. Contractor shall comply with applicable regulations and hold harmless the County for the Contractor's failure to comply. The identification or listing of certain of those laws, ordinances, rules and regulations in the Contract Documents does not excuse the Contractor from complying with other statutory requirements or provisions which are not set forth in these Contract Documents.

**GC 34. PERMITS AND LICENSES**

- A. Unless otherwise provided in the Contract Documents, the Owner shall give all notices and procure and pay for permits and governmental fees, licenses and inspections necessary for the proper execution and completion of the Work which are customarily secured after execution of the Contract.
- B. The Contractor shall obtain and pay fees for Encroachment Permits from the Local Municipality, County of Humboldt, and CalTrans as needed.
- C. LICENSES: Professional, trade, business and other licenses required by state statute or local government are entirely the responsibility of the Contractor and subcontractors, and shall be prerequisite to submitting a bid proposal or performing work on the Project.
- D. PERMITS:
1. Permits shall also include any cash deposits, returnable or otherwise, required by authorities having legal jurisdiction to make such demands;
  2. Owner reserves the right to cancel and declare null and void the Contract should any legal permit be refused or not issued for any reason;
  3. Due to cancellation for said reasons, Owner will not consider any claims by Contractor for loss of anticipated profits; or for work performed or materials procured prior to obtaining all permits required herein.
- E. Contractor shall procure and deliver to the Construction Administrator in forms prescribed and complete with dates and authorized signatures, all certificates of inspection, testing or approvals required of or by State or Civil authorities having legal jurisdiction or any public authority bearing on the performance of the Work.
- E. The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the performance of the Work.

**GC 35. TEMPORARY FACILITIES**

- A. The Contractor shall provide and maintain a temporary field base of operation on the sites. Said base of operation shall be for the exclusive use of the Contractor; and shall be wind and weatherproof, furnished with sufficient lighting to permit reading of blueprints. A complete set of Plans and Specifications shall be kept continuously at each site. When vacated, said structure shall be removed and the work in that area completed in accordance with the Contract requirements. Based on need, Contractor shall maintain and pay for all utilities and fuels; shall provide maintenance and other services necessary for proper use and operation; and comply with related provisions as specified.

- B. The Contractor shall maintain a viable communications system at each site acceptable to the Owner's Representative, and shall maintain the same until the final completion of the Contract and the acceptance of the Work. The Construction Administrator, Owner's Representative, Architect and Project Inspector shall have free and unrestricted use of this communications system for all purposes in conjunction with the Work.
- C. The Contractor shall provide water closets and urinals for use by its employees and subcontractors and their employees, and in no case shall the permanent plumbing fixtures of buildings on the site be used for this purpose without the written consent of the Owner's Representative.
- D. The Contractor and each subcontractor shall furnish, at their own expense, all tools, equipment, appliances, materials, scaffolding or other means necessary for the entire completion of the Work; and shall be responsible for the care and guarding of same.
- E. The Contractor and each subcontractor shall erect and maintain where necessary to the progress and completion of the Work, all exterior and interior scaffolding which shall be erected in accordance with the safety rules of the State of California; and use of which shall be unrestricted for all persons performing work on the Project.
- F. The Contractor shall pay the cost of all water, gas and electricity used by its employees or subcontractors during the process of the Work, or as required for temporary services or tests and inspections.
- G. Also refer to Division 01, General Requirements Sections.

**GC 36. LIABILITY FOR ACCIDENTS**

- A. The Contractor shall be liable for any and all loss, accident, neglect, injury, or damage to person, life or property which may be the result of or may be caused by its building operations or its execution of this Contract, and for which the Owner might be held liable; and shall protect and indemnify the Owner, the Owner's Representative, the Construction Administrator, the Project Inspector, the Architect, and/or any officer, agent or employee of the Owner and hold them harmless in every way from all claims and from all suits or actions at law for damage or injury to persons, life or property that may arise or be occasioned in any way because of its building operations or its execution of this Contract.
- B. Safety Precautions and Programs:
  - 1. The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work.
- C. The Contractor shall assume the full responsibility for personnel safety on the Project and the means and methods of construction that pertain to personnel safety. Contractor is responsible that such means and methods of construction are adequate to provide safety to all personnel while accomplishing all requirements and standards of the Contract Documents. The Owner, Architect, Construction Administrator, Project Inspector and/or their representatives have no obligation, responsibility, or jurisdiction over safety or means and methods of construction that pertain to personnel safety on the Project.

**GC 37. ACCIDENT PREVENTION**

- A. The Contractor shall erect and maintain, as required by existing conditions and progress of the Work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, and any other necessary construction required to secure safety of life or property; and shall maintain during all night hours sufficient lights to prevent accidents or damage to life or property.

- B. No earth, building, temporary or other structure shall be loaded, used or stressed so as to endanger its safety.
- C. In the event of an emergency affecting the safety of persons or property, the Contractor shall act, at its discretion, to prevent threatened damage, injury or loss. Claims by Contractor on account of alleged emergency actions shall be filed in writing with the Owner's Representative.

GC 38. EXISTING PREMISES AND IMPROVEMENTS

- A. The Contractor shall care for, preserve and protect existing structures, utilities and other features, fixtures or improvements at the premises, including adjacent or co-terminus properties which are not required to be removed or altered by reason of work under this Contract; and shall, likewise, care for and protect work or improvements newly placed or recently installed at the premises. Any part or portion of said existing or newly placed improvements which are removed, damaged or disturbed because of this work, shall be replaced, cleaned or otherwise returned to the original condition entirely at the expense of the Contractor.
- B. The removal and/or replacing of any existing structure, pipe, conduit, pavement or other existing improvement necessary for the proper completion of any work under the Contract shall be performed by the Contractor, and no claim for extra work shall be made on account of such removal and replacement.
- C. In case it shall be necessary to remove any telephone, telegraph or electrical power transmission poles, water pipes, electrical conduits, or underground structures of any character, or any portion thereof, the Owner or its agents shall be notified by the Contractor and the Contractor shall make the necessary arrangements for such removal. The right is reserved to the Owner and to gas, water, telephone, telegraph and electrical power transmission companies to enter upon the Work for purpose of making repairs and changes that have become necessary by reason of work related to the Project.
- D. The Contractor shall thoroughly investigate all existing poles, wires, pipes and conduits above and below ground and shall provide for the maintenance or replacing of same, in good condition and at no expense to the Owner. Any necessary new or additional pipe or materials shall be furnished by the Contractor at its expense.
- E. At the completion of the Work, the Contractor shall furnish the Owner's Representative with a written certificate from the owner of each and all conduits, pipes or structures to the effect that such replacements and maintenance have been satisfactorily performed.
- F. The Contractor shall amply protect all work or improvements, set in the building or at the premises, against any possible damage; and shall furnish all necessary building paper, rough boarding or other means or materials necessary therefore.
- G. Also refer to Division 01, General Requirements Sections.

GC 39. USE OF PREMISES AND CLEAN-UP

- A. During the progress of the Work, materials shall be neatly stacked at such points so as not to interfere with site access and shall be properly cared for and protected against damage by weather or other causes. Project staging and parking area are defined in the plans.
- B. In the case where there are several contractors operating at one time, arrangements must be made to allow the joint use of storage space so as to prevent delays in the Work and unnecessary inconveniences.
- C. At the end of each working day, or as directed by the Owner's Representative, Construction Administrator, Project Inspector or Architect, the Contractor shall clean the building, premises,



streets and adjacent properties of accumulated rubbish, debris, unnecessary appliances or any unused material which may constitute an obstruction to the progress or completion of the Work, whether the same was caused by its work or by the work of other crafts. Failure by the Contractor to maintain the site and building premises in a safe and clean condition will be considered a breach of contract and Contractor agrees to pay Owner for costs to have site cleaned and deduct said costs from any money due the Contractor under the contract.

- D. At the completion of the Work, and as one of the requisites thereof, the Contractor shall remove any and all tools, construction equipment, machinery, surplus materials, appliances, rubbish, packing, debris or other extraneous matter of any kind from the building, premises, sidewalks, streets or adjacent premises; Contractor shall go over all of its work and put the same in perfect order and condition and in strict accordance with the terms of the Contract; and shall repair or replace all damaged, broken or stained parts of its work, whether so injured by its workmen or others.
- E. No advertising signs of any kind shall be displayed on the building, premises, fences, offices or elsewhere upon the job, except the Project sign as called for in the specifications.
- F. At the completion of each phase of work of each kind of work or activity, the areas so used or involved shall be left in a "broom clean" condition daily unless otherwise more particularly required.

**GC 40. DIRECTION OF THE WORK**

- A. The Contractor shall do all of the Work and furnish all labor, materials, tools, and appliances, except as otherwise herein expressly stipulated, necessary or proper for performing the Work herein required in the manner and within the time herein specified. The mention of any specific duty or liability imposed upon the Contractor shall not be construed as a limitation or restriction of any general liability or duty imposed upon the Contractor by this contract, said reference to any specific duty or liability being made herein merely for the purpose of explanation. Until the completion and final acceptance by the Owner of all of the Work under and implied by the Contract Documents, the Work shall be under the responsible care and charge of the Contractor. The Contractor shall rebuild, repair, restore and make good all injuries, damages, re-erections and repairs occasioned or rendered necessary or caused of any nature whatsoever, excepting only acts of God not covered by the all-risk insurance policy called for in Article GC 4 and no other, to all or any portions of the Work except as otherwise expressly stipulated. Construction activities at the site shall be as required by the Contractor to complete the Project by the prescribed completion date. Contractor must comply with Noise Abatement Provisions required in other parts of the Plans and Specifications.
- B. The Contractor shall have control or charge over its subcontractors; shall be responsible to the Owner for the acts and omissions of its employees, subcontractors and their agents and employees, and other persons performing any of the Work under a contract with the Contractor, and for all orders or instructions from the Owner, Owner's Representative or the Architect. It shall be the Contractor's duty to see that all of the subcontractors commence their work properly at the proper time and carry it on with due diligence as not to cause delay or injury either to work or materials; and that all damage caused by them or their workmen be properly made good by them or by himself at no cost to the Owner.
- C. The Contractor shall keep on the work site at all times and until the acceptance certificate is issued, a competent Project Manager and Project Superintendent for the purpose of receiving and executing without delay any orders in keeping with the terms of the Contract issued by the Owner, Owner's Representative or Architect. This Superintendent shall have charge of Plans and Specifications kept on the job; shall be instructed to be familiarized closely with all the provisions of the Plans and Specifications and to follow them in a precise manner.

- D. If at any time the Superintendent or workman who shall be employed by the Contractor or any of its subcontractors shall be declared by the Owner's Representative to be incompetent or unfaithful in executing the Work, then the Contractor upon receiving written notice shall, forthwith, dismiss such person and shall not again employ him on any part of the Work.
- E. Contractor shall supervise and direct the Work using its best skill and attention, and shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract; except that said responsibilities shall not be construed to permit use of any material, process, method or means if they are deemed unsuitable by Owner's Representative.
- F. Processing of Change Orders, Cost Proposals and like administrative matters, shall follow the procedures established and approved by the Owner at commencement of work under the Contract. Change orders and other forms shall be as approved by the Owner's Representative or otherwise required or directed by Owner. Refer to GC 12.
- G. Review of Contract Documents: The Contractor shall carefully study and compare the Contract Documents and shall at once report to the Architect and the Owner's Representative any conflict, error, inconsistency or omission Contractor may discover. Refer to GC 11 A.
- H. The Contractor shall not be relieved from its obligations to perform the Work in accordance with the Contract Documents by the activities or duties of the Owner's Representative or Construction Administrator in their administration of the Contract, or by inspections, tests or approvals required or performed under GC 31, by person other than the Contractor. The right of general supervision by the Owner shall not make the Contractor an agent or employee of the Owner, and the liability of the Contractor for all damages to persons or to public or private property arising from the Contractor's execution of the Work shall not be lessened because of such general supervision.
- I. Construction Progress Schedule:  
In addition to the requirements herein regarding schedules, Contractor shall comply with all scheduling requirements of the Contract Documents, including, without limitation, Section 01 32 16, Construction Schedules.
1. The Contractor shall prepare and submit via the Construction Administrator to the Owner's Representative with copy to the Architect and the Project Inspector the Contractor's Initial Construction Schedule within ten (10) calendar days after date on the Notice to Proceed. The Contractor's Initial Construction Schedule shall be comprised of either a Simple Gantt Chart, if the contract value is less than one million dollars (\$1,000,000), or a Critical Path Method network, if the contract value is one million dollars (\$1,000,000) or more. The Contractor's Initial Construction Schedule shall show the dates on which each part or division of the Work is expected to be started and completed, and shall show all submittals associated with each work activity, allowing a minimum of twenty one (21) calendar days (per GC 16 F) for the Architect's review of each submittal unless a longer period of time is specified elsewhere in these Contract Documents. The work activities making up the schedule shall be of sufficient detail to assure that adequate planning has been done for proper execution of the Work and such that, in the sole judgment of the Owner, it provides an appropriate basis for monitoring and evaluating the progress of the Work. The schedule shall show the interdependence of each activity and a single critical path. The Contractor shall also submit a separate progress schedule listing all submittals required under the contract and when it is anticipated that each submittal will be submitted.
  2. The Contractor's Initial Construction Schedule shall show the sequence, duration in calendar days, and interdependence of activities required for the complete performance of all work. The Contractor's Initial Construction Schedule shall begin with the date of issuance of the Notice to Proceed and conclude with the date of final completion.
  3. Float, slack time, or contingency within the schedule (i.e., the difference in time between the Project's early completion date and the required contract completion date), and total float within the overall schedule, is not for the exclusive use of either the Owner or the

- Contractor, but is jointly owned by both and is a resource available to and shared by both Owner and Contractor as needed to meet contract milestones and the contract completion date.
4. The Contractor shall not sequester shared float through such strategies as extending activity duration estimates to consume available float, using preferential logic, or using extensive crew/resource sequencing, etc. Since float time within the schedule is jointly owned, no time extensions will be granted nor delay damages paid until a delay occurs which extends the Work beyond the Contract completion date. Since float time within the construction schedule is jointly owned, it is acknowledged that Owner caused delays on the Project may be offset by Owner caused time savings (i.e., critical path submittals returned in less time than allowed by the contract, approval of substitution requests which result in a savings of time to the Contractor, etc.). In such an event, the Contractor shall not be entitled to receive a time extension or delay damages until all Owner caused time savings are exceeded and the contract completion date is also exceeded.
  5. Comments made by the Owner on the Contractor's Initial Construction Schedule during review will not relieve the Contractor from compliance with the requirements of the contract documents. The review is only for general conformance with the scheduling requirements of the contract documents. Upon the Owner's request, the Contractor shall participate in the review of the Contractor's Initial Construction Schedule submissions (including the original submittal, all update submittals, and any re-submittals). The Owner may request the participation of subcontractor in these reviews, as determined necessary by the Owner. All revisions shall be resubmitted within fifteen (15) calendar days after the Owner's review.
  6. The submittal of a fully revised and acceptable Contractor's Initial Construction Schedule shall be a condition precedent to the processing of the first monthly payment application.
  7. On any project with a construction value equal to or greater than one million dollars (\$1,000,000), the Contractor must submit a Critical Path Method (CPM) network. The network shall provide a workable plan for monitoring the progress of all the elements of the Work, establish and clearly display the critical elements of the Work, forecast completion of the construction, and match the contract duration in time. Exclusive of those activities for submittal review and material fabrication and delivery, activity duration shall not be less than one (1) nor more than thirty (30) calendar days, unless otherwise approved by the Owner. In addition to the detailed network diagram, the Contractor shall submit the following reports with the original submittal and all updates and revisions:
    - a. Predecessor/Successor Report or a list showing the predecessor activities and successor activities for each activity in the schedule.
    - b. Activity Report sorted by early start or a list showing each activity in the schedule, arranged by early start dates.
  8. Regardless of which schedule method the Contractor elects to use in formulating the Contractor's construction schedule, and unless the Owner's Representative in writing each month, specifically waives this requirement, an updated construction schedule shall be submitted to the Owner's Representative five (5) days prior to the submittal of the Contractor's monthly payment request. The submittal of the updated construction schedule which satisfies the requirements of the Contract Documents accurately reflects the status of the Work, and incorporates all changes into the schedule, shall be a condition precedent to the processing of the monthly payment application. Updated schedules shall also be submitted at such other times as the Owner may direct. Upon approval of a change order or issuance of a direction to proceed with a change, the approved change shall be reflected in the next schedule update submittal by the Contractor, or other update submittal approved by the Owner.
  9. If completion of any part of the Work, the delivery of equipment or materials, or submittal of the Contractor submittals is behind the updated construction schedule and will impact the end date of the Work past the contract completion date, the Contractor shall submit in writing, a plan acceptable to the Owner for completing the Work on or before the current contract completion date.
  10. No time extensions shall be granted nor delay damages paid unless the delay can be clearly demonstrated by the Contractor on the basis of the updated construction schedule current as of the month the change is issued or the delay occurred and which delay cannot

be mitigated, offset, or eliminated through such actions as revising the intended sequence of work or other means. Contractor shall submit all disputes or claims under the provisions of GC 51, Claims Procedure, otherwise it shall be waived.

11. As a condition precedent to the release of retained funds, the Contractor shall, after completion of the Work has been achieved, submit a final Contractor's construction schedule which accurately reflects the manner in which the Project was constructed and includes actual start and completion dates for all work activities on the construction schedule.
- J. The Contractor shall forward all communications to the Owner, Project Inspector, Owner's Representative and Architect through the Construction Administrator.
- K. The Contractor shall keep an extra set of Plans and Specifications at the Project site at all times. The Contractor shall identify and dimension upon these Plans the exact locations of all pipes and conduits, and all changes in construction and details, and identify in these Specifications all changes in materials and equipment. Refer to Sections 01 77 00, Closeout Procedures and 01 78 39, Project Record Documents for requirements. The as-built Plans and Specifications shall be current (up-to-date) to qualify for payment and subject to verification by the Construction Administrator, Project Inspector, Architect or Owner's Representative. Upon completion of the Work, the Contractor shall provide these as-built Plans and Specifications for review by the Construction Administrator, Project Inspector, Architect or Owner's Representative prior to the final payment. The as-built Plans and Specifications shall be neatly drafted, printed on vellum and submitted as a CAD .dwg file. The requirements set forth herein are in addition to, and complementary of, the requirements set for in Section 01 77 00, Closeout Procedures and Section 01 78 39, Project Record Documents.

**GC 41. CUTTING, FITTING AND PATCHING**

- A. The Contractor shall do all cutting, fitting and patching of work that may be required to make its several parts come together properly, and prepare it to join or be joined by the work of other contractors; and Contractor shall make good after them.
- B. The Contractor shall not endanger any work by cutting, digging or otherwise; and shall not cut or alter the work of any other contractor without the written consent of the Architect; and shall not cut a beam, timber or support of any kind without the consent of the Architect. Under no circumstances shall any principal brace, timber, truss, support or other structural member be cut or structurally weakened in any way.
- C. Where the construction is required to join with or match existing work, it shall be finished exactly similar to that work so as to form complete, unified and finished work.
- D. Contractor shall be responsible for and particularly supervise each and every operation and all work which in any way may affect the structural integrity of the various works, including below, on, or above grade structures, and whether for temporary or permanent work.
- E. Any cost for repairs or restoration caused by cutting, digging or otherwise due to ill-timed or defective work shall be borne by the Contractor.
- F. Also refer to Division 01, General Requirements Sections.

**GC 42. RIGHT TO OCCUPY OR USE**

- A. The Owner reserves the right to occupy or use any part or parts, or the entirety of the building and/or grounds when the Owner deems the same may be safe for use or occupancy.
- B. The exercising of this right shall in no way constitute an acceptance of such parts, or any part of the Work, nor shall it in any way affect the dates and times when payments shall become due from

the Owner to the Contractor, nor shall it in any way prejudice the Owner's right under the Contract or any bonds guaranteeing the same. The Contract shall be deemed completed only when all the work contracted for shall be duly and properly performed and accepted by the Board of Supervisors.

- C. When any part or portion of the Project is to be used or occupied by Owner in advance of final completion and acceptance, and when duly notified by Owner's Representative, the Contractor shall arrange for completion of said portions of the Work the same as required under the Documents for the whole Work, including cleaning and other readying by the date stipulated with such notice.
- D. Contractor shall not be held responsible for any damage to the occupied part of the Project resulting from Owner's occupancy.
- E. Occupancy by Owner shall not be deemed to constitute a waiver of existing claims on behalf of Owner or Contractor against each other.
- F. Use and occupancy by Owner prior to Project acceptance shall not relieve Contractor's responsibility to maintain all insurance and bonds required of Contractor under the Contract until the entire Project is completed and accepted by Owner.
- G. If after written notification by the Owner of the intent to occupy, the Contractor feels that such occupancy will delay progress of the Work or will cause additional expense to the Contractor, Contractor may file a request for an equitable adjustment in Contract Price or Time of Completion, or both, with the Owner's Representative. If the Owner's Representative agrees he will either prepare a written change order for the Owner to sign or advise the Owner to delay occupancy.

**GC 43. CHANGE OF CONTRACT TIME & LIQUIDATED DAMAGES**

- A. Change by Change Order. The Contract Time may only be changed by change order. A request for an extension or shortening of the Contract Time shall be based on written notice delivered by the party making the request to County promptly after the occurrence of the event giving rise to the request and stating the general nature of the request. Notice of the extent of the request with supporting data shall be delivered to County and shall be accompanied by the written statement that the adjustment requested is the entire adjustment to which the requesting party has reason to believe it is entitled as a result of the occurrence of said event. No request for an adjustment in the Contract Time will be valid if not submitted in accordance with the requirements of this paragraph.
- B. Contract Time may be extended. The Contract Time will be extended in an amount equal to time lost due to delays beyond the control of Contractor if the request is made therefor as provided in this article. Such delays shall include, but not be limited to, acts of neglect by County or others performing additional work, or to fires, floods, labor disputes, epidemics, pandemics, abnormal weather conditions or acts of God.
- C. Delay and price change. All time limits stated in the contract documents are of the essence. There shall be no adjustment of Contract Price due to delays for fires, floods, labor disputes, epidemics, pandemics, abnormal weather conditions or acts of God. This provision shall not exclude recovery for damages (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court costs) for delay by either party.
- D. Delays in completion of work :
  - 1. Notice of delays. Whenever the Contractor foresees any delay in the prosecution of the Work, and in any event immediately upon the occurrence of any delay which the Contractor regards as unavoidable, Contractor shall notify County in writing of the probability of the occurrence of such delay and its cause in order that County may take immediate steps to prevent, if possible, the occurrence or continuance of the delay or, if this cannot be done, may determine whether the delay is to be considered avoidable or unavoidable, how long it continues, and to what extent the prosecution and completion of the Work are to be delayed thereby. It will be assumed that any and all delays which have occurred in the

prosecution and completion of the Work have been avoidable delays, except such delays as shall have been called to the attention of County at the time of their occurrence and found by County to have been unavoidable. The Contractor shall make no requests for extensions of time as to delay not called to the attention of County at the time of its occurrence.

2. Avoidable delays. Avoidable delays in the prosecution or completion of the Work shall include all delays which in the opinion of County would have been avoided by the exercise of care, prudence, foresight and diligence on the part of the Contractor or Contractor's subcontractors.
3. Unavoidable delays. Unavoidable delays in the prosecution or completion of the Work shall include all delays which, in the opinion of County, result from causes beyond the control of the Contractor and which could not have been avoided by the exercise of care, prudence, foresight and diligence on the part of the Contractor or the subcontractors and/or any suppliers. Delay in completion due to contract modifications ordered by County and unforeseeable delays in the completion of work or interference by other contractors employed by County will be considered unavoidable delays insofar as they interfere with the Contractor's completion of the Work.

**E. Extension of time:**

1. Avoidable delays. In case the Work is not completed in the time specified, including such extensions of time as may have been granted for unavoidable delays, the Contractor will be assessed damages for delay in accordance with liquidated damages provision. The Owner, however, shall have the right to grant an extension of time for avoidable delay if it is deemed in County's best interest to do so. During such extension of time, the Contractor will be charged for engineering and inspection services and other costs but will not be assessed damages for the delay.
2. Unavoidable delays. For delays which County considers to be unavoidable, the Contractor shall, pursuant to Contractor's application, be allowed an extension of time beyond the time herein set forth, proportional to such delay or delays, in which to complete the contract. During such extension of time, neither extra compensation for engineering and inspection provided nor damages for delay will be charged to the Contractor.
3. Liquidated damages. County and Contractor recognize that time is of the essence and that County will suffer financial loss if the Work is not completed within the time specified above, plus any extensions thereof allowed in accordance with this contract. They also recognize the delays, expense and difficulties involved in proving the actual loss suffered by County if the Work is not completed on time. Accordingly, instead of requiring any such proof, and due to impracticality and difficulty of ascertaining exact damages caused by delay, County and Contractor agree that as liquidated damages for delay (but not as a penalty) Contractor shall pay County that amount set forth in the Contract, or if no such amount is specified, then one-half of one percent of the total Contract Price for each day that expires after the time specified above for completion. In case of joint responsibility for delay in the final completion of the Work, where two or more separate contracts are in force at the same time and cover work at the same site, liquidated damages assessed against any one Contractor will be based upon the individual responsibility of that Contractor for the delay as determined by, and in the judgment of, County. County shall have the right to deduct the liquidated damages from any money in its hands, otherwise due, or to become due, to Contractor, or to sue for and recover compensation for damages for nonperformance of this contract within the time stipulated. County has determined and the Contractor acknowledges that the liquidated damages as established herein are governed by the provisions of Government Code § 53069.85 and are predicated upon the reasonable damages accruing to County stemming from any delay in the completion of this Project.

**GC 44. HOURS OF WORK**

- A. The time of service of any labor, workman or mechanic employed upon any of the work herein specified, shall be limited and restricted to that allowed by law, and no laborer, workman or mechanic employed upon said work herein specified shall be required or permitted to labor more

than that allowed by law, except in cases of extraordinary emergency caused by fire, military or naval defenses or works in time of war.

- B. Within thirty (30) calendar days after any workman is permitted to work over that allowed by law in any one calendar day due to such an extraordinary emergency, the Contractor shall file with the Owner a verified report setting forth the nature of the said emergency, which shall contain the name of said workman and the hours worked by them on said particular day; and failure to file said report within the said thirty day period shall be prima facie evidence that no extraordinary emergency existed.
- C. The Contractor and each subcontractor shall keep an accurate record showing the name of and actual hours worked by each worker employed by said Contractor and subcontractor in connection with the work contemplated by this agreement. The record shall be kept open at all reasonable hours to inspection by the Owner or its officers or agents and by the Division of Labor Law Enforcement of the Department of Industrial Relations.
- D. The Contractor shall forfeit as a penalty to the Owner twenty-five dollars (\$25) for each laborer, workman or mechanic employed in the execution of this Contract by it or by any subcontractor under it, upon any public work herein specified for (a.) each calendar day during which any laborer, workman or mechanic is required or permitted to labor more than that allowed by law; or (b.) each calendar week during which any laborer, workman or mechanic is required or permitted to labor more than that allowed by law of the Labor Code of the State of California. Said sums and amounts which shall have been so forfeited pursuant to the herein paragraph and said provisions of said Labor Code shall be withheld and retained from payments due to the Contractor under this Contract, pursuant to this Contract, and the terms of said Labor Code. ;

**GC 45. PREVAILING WAGE RATES & PAYROLL RECORDS**

Contractor shall comply with all requirements of Federal and California law with respect to labor relations, including without limitation, as to the payment of prevailing wages, working hours, payroll records and apprentices. To the extent that there is anything in this Agreement in conflict with or inconsistent with Federal or California law, such law shall govern and control.

**A. Prevailing Wage Rates**

- 1. Pursuant to section 1770 and following of the Labor Code of the State of California, the Director of Industrial Relations has ascertained the general prevailing rate of per diem wages and the rates for overtime and holiday work in the locality in which the work is to be performed for each craft, classification or type of worker needed to execute the Contract which will be awarded to the successful bidder, copies of which are on file at Humboldt County Public Works, 1106 Second Street, Eureka, CA 95501, Phone (707) 445-7493 and are available to interested parties on request and by reference are incorporated herein and made a part hereof. Contractor will maintain a copy of prevailing rates and wages on the job site during the contract period.
- 2. It shall be mandatory upon the Contractor and upon any subcontractor under it, to pay not less than the specified rates to all laborers, workers, and mechanics employed in the execution of the Contract. It is further expressly stipulated that the Contractor shall, as a penalty to the Owner, forfeit not more than \$200 for each calendar day, or portion thereof, for paying less than the stipulated prevailing rates for any work done under this Contract by Contractor or by any subcontractor under it; and Contractor agrees to comply with all provisions of Section 1775 of the Labor Code.

3. In case it becomes necessary for the Contractor or any subcontractor to employ on the Project under this Contract any person in a trade or occupation (except executives, supervisory, administrative, clerical, or other non-manual workers as such) for which no minimum wage rate is herein specified, the Contractor shall immediately notify the Owner, who will promptly thereafter determine the prevailing rate for such additional trade or occupation and shall furnish the Contractor with the minimum rate based thereon. The minimum rate thus furnished shall be applicable as a minimum for such trade or occupation from the time of the initial employment of the person affected and during the continuance of such employment. Each contractor shall file a certified copy of the payroll records with the entity that requested the records within ten (10) days after receipt of a written request.
  4. Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the Owner, shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address, and social security number. The name and address of the contractor awarded the contract for performing the contract shall not be marked or obliterated.
  5. The Contractor shall inform the Owner of the location of the payroll records, including the street address, city and county, and shall, within five working days, provide a notice of any change of location and address.
  6. The Contractor shall be responsible for compliance with this section.
- B. Payroll Records. The Contractor agrees to comply with all requirements of Section 1776 of the Labor Code, including, without limitation, the following:
1. The Contractor and each subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by it in connection with the public work. Each payroll record shall be verified by written declaration, under penalty of perjury, stating both the following:
    - a. The information contained in the payroll record is true and correct.
    - b. The employer has complied with the requirements of sections 1771, 1811 and 1815 of Labor Code for any work performed by its employees on the Project.
  2. The above-referenced payroll records shall be certified and shall be available for inspection at all reasonable hours at the principal office of the Contractor on the following basis:
    - a. A certified copy of an employee's payroll record shall be made available for inspection or furnished to the employee or his/her authorized representative on request;
    - b. A certified copy of all payroll records shall be made available for inspection or furnished upon request to the Owner or the Division of Labor Standards Enforcement.
    - c. A certified copy of all payroll records shall be made available upon request by the public for inspection or copies thereof made; provided, however, that a request by the public shall be made through either the Owner or the Division of Labor Standards Enforcement. If the requested payroll records have not been provided, pursuant to paragraph b. above, the requesting party shall, prior to being provided the records, reimburse the cost of the Contractor, subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of the Contractor.
- C. Pursuant to Section 1771.1(a) of the California Labor Code, a contractor or subcontractor shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public Contract Code, or engage in the performance of any contract for public work, as defined in Sections 1770 et seq. of the Labor Code, unless currently registered and qualified to perform public work pursuant to Section 1725.5 of the Labor Code. It is not a violation of Section 1771.1(a) for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Section 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Section 1725.5 at the time the contract is awarded.

GC 46. TAXES



- A. Any federal, state or city tax, including sales, excise, use and other taxes payable on articles furnished by the Contractor under the Contract shall be included in the Contract Price and paid for by the Contractor.

**GC 47. SUBCONTRACTORS**

- A. In accordance with the provisions of Section 4100 et seq, of the Public Contract Code of the State of California, each bidder for the Work herein specified shall set forth in its Bid Proposal the name and location of the place of business of each subcontractor who will perform work or labor or render service to the Contractor in or about the construction of the Work or improvements in an amount in excess of one-half (1/2) of one percent (1%) of the Contractor's total Base Bid; and the portion of the Work which will be done by each subcontractor if the Contract or said work is awarded to said Bidder.
- B. If the Contractor fails to specify a subcontractor or specifies more than one subcontractor for the same portion of the Work to be performed on the Contract in excess of one-half of one percent of the Contractor's total Bid, Contractor agrees to perform such portion himself and, if Contractor's Bid is accepted, Contractor shall not be permitted to subcontract that portion of the Work.
- C. Should the Contractor violate any provision of the subletting and subcontracting Fair Practices Act, the Contractor will be deemed in violation of the contract and the Owner may at its option, (1) cancel the Contract. (2) assess upon the Contractor a penalty in an amount of not more than ten percent (10%) of the amount of the subcontract involved.
- D. Prior to the award of the Contract, the Owner's Representative shall notify the successful bidder in writing if the Owner, after due investigation, has reasonable objection to any person or organization on the required list of subcontractors.
- E. The Contractor shall not contract with any subcontractor or any person or organization for any portion of the Work who has not been accepted by the Owner. The Contractor will not be required to contract with any subcontractor or person or organization against whom Contractor has a reasonable objection.
- F. If after the award of the contract, the Owner refuses to accept any person or organization on the required list of subcontractors, the Contractor shall submit an acceptable substitute and the Contract Price shall be increased or decreased by the difference in cost occasioned by such substitution, and an appropriate Change Order shall be issued; however, no increase in the Contract Price shall be allowed for any such substitution unless the Contractor has acted promptly and responsibly in submitting a name with respect thereto prior to the award.
- G. After the award, the Contractor shall resubmit the list of subcontractors, corrected or modified as may be necessary as directed by the Owner.
- H. Subcontracting
1. Nothing contained in the Contract Documents shall be construed as creating any contractual relationship between Owner and any subcontractor. The Divisions or Sections of the Specifications, and the divisioning of the Drawings are not intended to control the Contractor in dividing the Work among subcontractors or to limit the Work performed by any trade.
  2. The Owner, Owner's Representative or Architect will not undertake to settle any differences between the Contractor and its subcontractors or between subcontractors.
  3. The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work: (a) to bind subcontractors to the Contractor to the terms of the Contract and these General Conditions and other Contract Documents insofar as applicable to the work of subcontractors; (b) to require subcontractors to assume towards Contractor all the obligations and responsibilities which Contractor, by these Contract Documents, assumes

toward Owner; (c) that requires subcontractor to agree to an assignment of the subcontract to the Owner and/or to any third party as designated by the Owner in its sole discretion, including without limitation, a replacement contractor; and (d) to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Contract Documents. The Contractor shall make available to each proposed subcontractor prior to the execution of the subcontract, copies of the Contract Documents to which the subcontractor will be bound by this paragraph and identify to the subcontractor any terms and conditions of the proposed Subcontract which may be at variance with the Contract Documents. Each subcontractor shall similarly make copies of such documents available to its sub-subcontractors.

4. Each subcontractor shall be required to:
  - a. Enter into a written contract with Contractor acknowledging that no employee/employer relationship exists between Contractor and subcontractor and that no Workers' Compensation, unemployment benefits, or other personnel benefits are required by or available to subcontractor through Contractor or County.
  - b. Hold harmless and to indemnify, defend and save harmless Contractor and County and its Board Members, officers and officials, Owner's Representative, Construction Administrator, Project Inspector, and the Architect and their agents, employees and volunteers, from any and all claims and losses accruing or resulting to any and all contractors, subcontractors, material suppliers, laborers, and any other person, firm or corporation who may be injured or damaged by subcontractor in the performance of this Agreement.
5. The Contractor shall:
  1. Schedule and coordinate the work of all subcontractors;
  2. Instruct all subcontractors to consult with other subcontractors to ascertain the locations of their various materials including stored materials and to familiarize themselves with their own material locations, making such changes as required to obtain the best results;
  3. Instruct all subcontractors to schedule their work and cooperate with the other subcontractors to avoid delays, interferences, and unnecessary work, to conform to the schedule of operations as indicated in the progress schedule, and make installations when and where directed;
  4. Require subcontractors to make all necessary changes, including removing and reinstalling of materials, at their sole expense if they fail to check with other subcontractors, and their installed work is later found to interfere with work of other subcontractors; and
  5. Follow up to ensure that all subcontractors install their work when and where directed, and in accordance with the Contract Documents.

I. **Payments to Subcontractors:**

1. Contractor shall pay each subcontractor or supplier upon receipt of payment from Owner, an amount equal to the percentage of completion allowed to Contractor on account of such work performed or material supplied. Contractor shall also require each subcontractor to make similar payments to its subcontractors or suppliers.
2. Contractor shall pay each subcontractor a just share of any insurance monies received by Contractor when and as applicable, and Contractor shall require each subcontractor to make similar payments to their subcontractors or suppliers.
3. The Owner's Representative may, on request and at its discretion, furnish to any subcontractor, if practicable, information regarding percentages of completion certified to the Owner on account of work done under the Contract.
4. Neither Owner, Owner's Representative or Architect shall have any obligation to see to the payment of any monies to any subcontractor except as may otherwise be required by law.

GC 48. **RECORDS, ACCOUNTS AND SEGREGATED PRICES**

- A. The Contractor must maintain all books, records, documents, and other evidence directly pertinent to the performance of the Work in accordance with generally accepted accounting principles and

practices consistently applied. The Contractor must also maintain all financial information and data used by the Contractor in the preparation or support of any cost application, or other request for equitable adjustment. Owner and its representatives will have access upon 24 hours advanced written notice, at all times during normal business hours, to all Contractor's books, summary reports, records, accounts, estimates, documents, detailed financial information, certified payroll records, and all other relevant information and documentation for the purposes of inspection, audit, and copying. The Contractor will, at no cost to Owner, provide proper facilities for such access, inspection and copying purposes.

Contractor shall prepare a detailed daily report in a format and containing substance subject to Owner's approval, which shall record, at a minimum, the daily work performed, the names of the trades (subcontractors) performing work and the quantity of workers for each trade, the work performed, materials delivered, equipment stored on site, weather, inspections and tests performed (and their results) and factual information sufficient to detail the daily events. All such reports shall be signed by Contractor's representative and delivered, on a weekly basis, to Owner. The Contractor shall include in the daily report information that identifies any impacts to Contractor's (including all subcontractors') activities and their productivity that Contractor contends or observes is due to conduct for which the Owner is believed to be responsible. The absence of any such notice will be understood by Owner to be an acknowledgement that Owner did not cause or contribute to any delays or impacts to the Project. Preparing and providing such daily reports is not a substitution for, or in place of the requirements of, or Contractor's obligations under, the Contract Documents.

- B. Contractor agrees to include and make the requirements of this section applicable to all subcontracts, of any tier, or purchase orders in excess of \$10,000, at any tier.
- C. If required for convenience of Owner's accounting, Contractor shall furnish segregated prices for various other portions of the Work. These segregated prices shall be in addition to or separate from the required Schedule of Values.
- D. Records must be maintained and made available during the performance of work and for five (5) years after final payment, and until final settlement of all disputes, claims, or litigation, whichever occurs later. In addition, those records which relate to any portion of this Agreement, to any change order, to any dispute, to any litigation, to the settlement of any claim arising out of such performance, or to the cost or items to which an audit exception has been taken, must be maintained and made available until final payment or final resolution of such dispute, litigation, claim, or exception, whichever occurs later.
- E. The right of access provisions of this section applies to all financial records pertaining to this Agreement:
  - (1) to the extent the records pertain directly to Contract performance under the Agreement;
  - (2) to the extent required for verification of the costs incurred where such costs are the basis for billings pursuant to this Agreement including Change Orders;
  - (3) to the extent there is any indication of violation of the California False Claims statute or that fraud, gross abuse, or corrupt practices may be involved;
  - (4) if the Agreement is terminated for default or convenience.

**GC 49. LIABILITY FOR TREES**

- A. In case of damage to or loss of trees due to carelessness or lack of sufficient protective measures specified, Contractor shall forfeit an amount as agreed to following the assessment and determination of replacement cost by an independent professional arborist.

**GC 50. LIABILITY FOR SURVEY MARKS**

- A. In case of damage to, disturbance or removal of survey marks, field markers, monuments, or other survey or layout devices due to carelessness or lack of sufficient protective means, the party

responsible for such damage, disturbance or removal shall be liable for the expense to have them replaced and reset pursuant to Section 8771 of the California Business and Professions Code.

**GC 51. CLAIMS PROCEDURES**

**A. Notice of Potential Claim (NOPC)**

1. The Contractor is not entitled to additional compensation for any cause, including a disagreement, protest, or change, an act or failure to act by the County, or the happening of an event, thing or occurrence, unless the Contractor has given the County advance written notice of potential claim (NOPC). The NOPC must clearly describe the nature, circumstances, and basis of the potential claim, and must explain the reasons that the Contractor believes additional compensation and/or time will or may be due, the nature of the costs and/or time involved, the amount of the potential claim, a request for equitable adjustment, and written and verifiable documentation and support. The nature, circumstances, basis, and reasons must remain consistent.
2. Except as otherwise required in the Contract Documents, the Contractor must promptly provide an NOPC to the County upon discovery of concealed or unknown conditions or a disagreement, protest, situation, event, or occurrence that may result in a claim. This notice must be submitted no more than 7 Calendar Days after the discovery or occurrence of an event that may be the basis for a claim for additional compensation or time; failure to do so waives the claim.
3. If costs or time cannot be reasonably determined at the time the NOPC is provided, the NOPC must be amended to include quantified cost and time impacts within 30 Calendar Days after work has ceased on the event that prompted the NOPC; failure to do so waives the claim. For NOPC events that extend more than 30 Calendar Days the Contractor must provide a monthly accounting of ongoing costs and time impacts by the 5th day of the succeeding month; failure to do so waives the claim.

**B. Duty to Mitigate Damages**

1. The Contractor is required to take all reasonable and practical efforts to mitigate the damaging effects of a potential current or future claim it perceives as a result of an act or failure to act on the part of the County, or as a result of an event, thing or occurrence. Written notice by the Contractor of a potential claim does not excuse the Contractor from pursuing the mitigation of a claim in good faith and with due diligence. Where possible, or if directed by the County, the Contractor must be prepared to discuss various methods of mitigation with the County prior to actual mitigation.
2. The obligation to minimize foreseeable damages requires that the Contractor use reasonable care and diligence to prevent an unwarranted incurrence of damages from a delay caused by the other party or an unforeseen event. In evaluating a delay, if, in the opinion of the County, the delay could have been avoided by due care of the Contractor, the Contractor is responsible for the additional costs attributed to the failure to mitigate.

C. Contractor's surety or sureties shall be bound by any award or judgment rendered in any proceeding arising from the Project or undertaken in accordance with the Contract Documents. Further, Contractor's surety or sureties shall be bound by and subject to the dispute resolution provisions set forth herein, and Contractor's surety or sureties shall, at the request of County (or Contractor), participate in any dispute resolution proceedings, including mediation or litigation, that occur pursuant to the Contract Documents.

D. The County and Contractor intend that differences between the County and Contractor, arising under the Agreement, be brought to the attention of the County at the earliest possible time in order that such matters may be settled, if possible, or other appropriate action promptly taken. The

County and Contractor agree to initially strive to resolve all disputes amicably and in an informal manner. If the dispute resolution involves a change in the Contract work, increase or decrease in the compensation due the contractor, or adjustment in the time of completion of the Work, then the informal dispute resolution shall be confirmed by a Change Order pursuant to the Contract Documents. Informal discussions or negotiations with the County or its representatives concerning informal resolution of a dispute shall not toll or suspend the claim filing and other deadlines provided below, unless so provided by the County in writing. Contractor, and Contractor's surety or sureties, shall be bound by and subject to the dispute resolution provisions as set forth herein, and Contractor's surety or sureties shall, at the request of the County (or Contractor), participate in any dispute resolution proceedings, including mediation, arbitration or litigation that may occur pursuant to the Contract Documents.

Nothing set forth herein constitutes a waiver of the government claim filing requirements pursuant to Title 1, Division 3.6 of the California Government Code or otherwise set forth in local, state and federal law.

- E. Contractor shall not be entitled to any additional time to complete work or to the payment of any additional compensation for claimed extra work (or otherwise on account of any claim, cause, act, failure to act, or happening of any event or occurrence) unless the County has issued a Change Order pursuant to the Contract Documents, or a Claim has been timely filed and approved pursuant to the Contract Documents. If the Contractor fails to timely file a written Claim in accordance with the Contract Documents, then the Contractor shall be deemed to have waived any right or remedy to thereafter pursue the claim against the County in any administrative, arbitration or litigation proceeding.
- F. For purposes of this section:
1. "Claim" means a separate demand by the Contractor sent by registered mail or certified mail with return receipt requested, for one or more of the following:
    - a. A time extension, including, without limitation, for relief from damages or penalties for delay assessed by the County under the Contract for the Project.
    - b. Payment by the County of money or damages arising from work done by, or on behalf of, the Contractor pursuant to the Contract for the Project and payment for which is not otherwise expressly provided or to which the claimant is not otherwise entitled.
    - c. Payment of an amount that is disputed by the County.
  2. "Contractor" means any type of contractor within the meaning of Chapter 9 (commencing with Section 7000) of Division 3 of the California Business and Professions Code who has entered into a direct contract with the County for the Project.
  3. "Subcontractor" means any type of contractor within the meaning of Chapter 9 (commencing with Section 7000) of Division 3 of the California Business and Professions Code who either is in direct contract with a Contractor or is a lower tier subcontractor.
- G. Requirements for Filing of Contract Claim; Contents; Filing Deadline
1. Contents. The Contractor may file a "Contract Claim" with the County. A Contract Claim must (a) be in writing; (b) be labeled or clearly indicated as a claim under the Agreement; (c) set forth in detail the reasons why the Contractor believes additional compensation or a time extension is or may be due, the nature of the costs involved, and, insofar as possible, the amount of the Claim; (d) include (or reference earlier provided) documents that support and substantiate the Claim; and (e) include the following certification, properly completed and executed by Contractor or any officer of Contractor:

I, \_\_\_\_\_, BEING THE \_\_\_\_\_ (must be an owner or officer) OF \_\_\_\_\_ (CONTRACTOR), DECLARE UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA, AND I DO PERSONALLY CERTIFY AND ATTEST THAT: I HAVE THOROUGHLY REVIEWED THE ATTACHED CLAIM FOR ADDITIONAL COMPENSATION AND/OR EXTENSION OF

TIME, AND KNOW ITS CONTENTS, AND SAID CLAIM IS TRUTHFUL AND ACCURATE; THAT THE AMOUNT AND/OR CONTRACT TIME EXTENSION REQUESTED ACCURATELY REFLECTS THE CONTRACT ADJUSTMENT FOR WHICH THE OWNER IS LIABLE; AND FURTHER, THAT I AM FAMILIAR WITH CALIFORNIA PENAL CODE SECTION 72 AND CALIFORNIA GOVERNMENT CODE SECTION 12650, ET SEQ., PERTAINING TO FALSE CLAIMS, AND FURTHER KNOW AND UNDERSTAND THAT SUBMISSION OR CERTIFICATION OF A FALSE CLAIM MAY LEAD TO FINES, IMPRISONMENT AND/OR OTHER SEVERE LEGAL CONSEQUENCES.

2. Filing Deadline. A Contract Claim must be submitted to the County within the following Claim filing deadlines: (a) if a deadline is set forth in the Contract Documents for filing of the particular Claim, then the Claim must be filed by the specified time; (b) if the Claim relates to extra, additional or unforeseen work for which the Contractor intends to demand additional compensation, a time extension, or both, notice shall be given to the County prior to the time that the Contractor commences performance of the work giving rise to the potential claim for additional compensation or time extension, and Contractor shall not proceed with that work until so directed by the County; and (c) for all other Claims not included within (a) or (b), the claim must be filed on or before 15 days after the date of the occurrence, event or circumstance giving rise to the Claim. In no event shall a Contract Claim be filed later than the date of final payment.

H. Claims Subject to Public Contract Code Section 9204; Procedure

1. Application. This subsection H applies solely to the handling and resolution of a Contract Claim(s) sent to the County by registered mail or certified mail with return receipt requested in accordance with Public Contract Code section 9204(c)(1).
2. Claims Handling Procedure. With respect to any Contract Claim(s) sent to the County in accordance with this Section, the provisions of Public Contract Code section 9204 shall apply, and are hereby incorporated by reference into these Standard Provisions and set forth in full in *Appendix A* to these General Conditions.
3. Claims Procedure Post-Mediation. In the event mediation, if any, is unsuccessful pursuant to Public Contract Code section 9204, and all or parts of the Contract Claim(s) remain in dispute, then the Contractor shall thereafter comply with the Claim procedures as set forth below ("Claims Equal to or Less Than \$375,000") or ("Claims Exceeding \$375,000"), as applicable.

I. Claims Equal to or Less than \$375,000; Procedure

1. Application. This Section applies solely to the handling and resolution of a Contract Claim(s) that is/are in an amount equal to or less than Three Hundred Seventy-Five Thousand Dollars (\$375,000).
2. Claims Handling Procedure. With respect to any Contract Claim(s) subject to this section, the provisions of Public Contract Code section 20104, et seq. shall apply, and are hereby incorporated by reference into these Standard Provisions and set forth in full in *Appendix B* to these General Conditions.
3. Agreement to Opt-Out. Notwithstanding anything to the contrary in the Contract Documents, the County and Contractor may mutually agree at any time, in writing, that any Claim(s) to which the obligations set forth in this Section apply (i.e., unresolved Claims in an amount equal to or less than \$375,000) shall be subject to the dispute resolution requirements as set forth below applicable to the resolution and handling of claims in an amount in excess of \$375,000. Should the County and Contractor so agree in writing, the County and Contractor shall follow the requirements with respect to mediation and, if necessary, litigation, in accordance with Section J below.

- J. Contract Work Pending Claim Resolution. In the event of any dispute between the County and Contractor, or during the pendency of any Contract Claim(s) or associated proceedings under this Section or the Contract Documents, Contractor shall not stop, or delay performance of, the Work, but shall prosecute the Work diligently to completion in the manner directed by the County.
- K. Disputes Involving Architect or Design Professionals. In the event that any Claim(s) asserted by the Contractor arise from or is/are related, in any manner, to conduct or actions for which the Architect or other design professional may be responsible, the County and Contractor acknowledge and agree that the County may, in its sole discretion, require the participation and/or joinder of the Architect or other design professional in any dispute proceeding under this Section. This right shall remain solely within the discretion of the County, and Contractor shall have no rights under the Contract Documents to require or seek to compel the participation and/or joinder of the Architect or other design professional in any dispute proceeding under this Section or elsewhere under the Contract Documents.
- L. Application of Section. The procedures and remedies set forth in this Section shall not apply to: (i) any claim by the County against the Contractor or its surety or sureties (unless the County, in its sole discretion, opts to proceed hereunder); (ii) any claim or dispute relating to stop notices; or (iii) any claim relating to the approval, refusal to approve or substitution of any subcontractor, regardless of tier, pursuant to Public Contract Code section 4700, et seq.

**GC 52. HAZARDOUS MATERIALS AND / OR DIGGING TRENCHES**

- A. The following requirements shall be applicable to the Project in the event that the Contractor encounters hazardous materials and/or the Work involves digging trenches or excavations that extend deeper than four feet below the surface:
- B. The Contractor shall promptly, and before the following conditions are disturbed, notify the local public entity, in writing, of any: (1) Material that the contractor believes may be material that is hazardous waste, as defined in Section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law. (2) Subsurface or latent physical conditions at the site differing from those indicated by information about the site made available to bidders prior to the deadline for submitting bids. (3) Unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract.
- C. Upon receipt of notice from the Contractor, the County shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in the contractor's cost of, or the time required for, performance of any part of the Work shall issue a change order under the procedures described in the contract.
- D. In the event that a dispute arises between the County and the Contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in the Contractor's cost of, or time required for, performance of any part of the Work, the Contractor shall not be excused from any scheduled completion date provided for by the contract, but shall proceed with all work to be performed under the contract. The Contractor shall retain any and all rights provided either by contract or by law which pertain to the resolution of disputes and protests between the contracting parties. Contractor has no right to an adjustment in Contract Time or Price after acceptance of final payment.

**GC 53. NONDISCRIMINATION**

- A. During the performance of this contract, the Contractor and its subcontractors shall not deny the Contract's benefits to any person on the basis of religion, color, ethnic group identification, sex, age, physical or mental disability, nor shall they unlawfully discriminate, harass or allow

harassment, against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, disability (including HIV and AIDS), medical condition (cancer), age (over 40), marital status, denial of family care leave and denial of pregnancy disability leave in connection with any program or activity funded in whole or in part by Federal and/or State funds provided through this grant contract.

- B. Contractor and all subcontractors shall insure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment. Contractor and subcontractors shall comply with the provisions of the Fair Employment and Housing Act (Government Code, Section 12990 [a-f] et seq.) and the applicable regulations promulgated thereunder (California Code of Regulations, Title 2, Section 7285.0 et seq.).
- C. The applicable regulations of the Fair Employment and Housing Commission implementing Government Code, Section 12990 (a-f), set forth in Chapter 5 of Division 4 of Title 2 of the California Code of Regulations are incorporated into this Contract by reference and made a part hereof as set forth in full. Contractor and subcontractors shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other agreement.
- D. Contractor shall comply with all applicable nondiscrimination laws and regulations.
- E. The Contractor and all subcontractors shall include the nondiscrimination and compliance provisions of this clause in all contracts and subcontracts to perform work under the contract.

**GC 54. RESPONSIBILITY FOR COMPLIANCE WITH OSHA**

- A. All work, materials, work safety procedures and equipment shall be in full accordance with the latest OSHA rules and regulations.
- B. Contractor warrants that Contractor and each of its subcontractors shall, in performance of this Contract, comply with each and every compliance order issued pursuant to OSHA and CAL-OSHA. The Contractor assumes full and total responsibility for compliance with OSHA and CAL-OSHA Standards by its subcontractors as well as itself. The cost of complying with any compliance order and/or payment of any penalty assessed pursuant to OSHA and CAL-OSHA shall be borne by the Contractor. Contractor shall save, keep and hold harmless the Owner and all officers, employees and agents thereof from all liabilities, costs or expenses in law or in equity, that may at any time arise or be set up because of Contractor's or subcontractor's non-compliance or alleged non-compliance with OSHA and CAL-OSHA requirements.
- C. Nothing contained herein shall be deemed to prevent the Contractor and its subcontractors from otherwise allocating between themselves responsibility for compliance with OSHA and CAL-OSHA requirements; provided, however, that the Contractor shall not thereby be, in any manner whatsoever, relieved of its responsibility to the Owner as herein above set forth.

**GC 55. NUCLEAR FREE HUMBOLDT COUNTY ORDINANCE COMPLIANCE**

Neither the Contractor or its subcontractors or their suppliers are Nuclear Weapons Contractors and are not knowingly or intentionally engaged in the research, development, production, or testing of nuclear warheads, nuclear weapons systems, or nuclear weapons components, as defined by the Nuclear Free Humboldt County Ordinance. Contractor and its subcontractors and/or their suppliers agree to notify Owner immediately if they become a nuclear weapons contractor as defined above.

**GC 56. DISCOVERY OF HUMAN REMAINS OR AN ARCHAEOLOGICAL SITE**

- A. If cultural materials (e.g., chipped or ground stone, historic debris, building foundations, or bone) are discovered during ground-disturbance activities, work within 20 meters (66 feet) of the discovery shall be stopped, in accordance with Title 14 CCR 15064.5 [f]). The Owner's



Representative will retain a professional archaeologist who meets the Secretary of the Interior's Standards and Guidelines to evaluate the materials and offer recommendations for further action. In addition, if Native American archaeological remains are inadvertently encountered, the Owner's Representative will notify the Tribal Historic Preservation Officers of the tribes which are traditionally and culturally affiliated with the geographic area of the project. The affected tribes will be provided the opportunity to observe the findings in the field and make recommendations for further action. Work near the archaeological find(s) shall not resume until the Owner's Representative provides notice that the required consultations have been performed.

- B. If human remains are discovered during project construction, work within 20 meters (66 feet) of the discovery location, and within any nearby area reasonably suspected to overlie human remains, will cease (in accordance with Public Resources Code, Section 7050.5). The Humboldt County Coroner will be contacted to determine if the cause of death must be investigated. If the coroner determines that the remains are of Native American origin, it is necessary to comply with state laws regarding the disposition of Native American burials, which fall within the jurisdiction of the California Native American Heritage Commission (NAHC) (Public Resources Code, Section 5097). In this case, the coroner will contact NAHC. The descendants or most likely descendants of the deceased will be contacted. Work shall not resume until the descendants or most likely descendants have made a recommendation to the Owner's Representative for excavation work with direction regarding appropriate means of treatment and disposition, with appropriate dignity, of the human remains and any associated grave goods, as provided in Public Resources Code, Section 5097.98.

**GC 57. CONTRACTOR RESPONSIBILITY AND DEBARMENT**

- A. A responsible contractor is a contractor who has demonstrated the attribute of trustworthiness, as well as quality, fitness, capacity and experience to satisfactorily perform the contract. It is the County's policy to conduct business only with responsible contractors. (Ord. 2291, § 1, 01/07/2003)
- B. The Contractor is hereby notified that, in accordance with Title II, Division 14 of the County Code, if the County acquires information concerning the performance of the Contractor on this or other contract which indicates that the Contractor is not responsible, the County may, in addition to other remedies provided in the contract, debar the Contractor from bidding on County contracts for a specified period of time, not to exceed three (3) years, and terminate any or all existing contracts the Contractor may have with the County. (Ord. 2291, § 1, 01/07/2003)
- C. The County may debar a contractor if the Board of Supervisors finds, in its discretion, that the contractor has done any of the following: (1) violated any term of a contract with the County; (2) committed any act or omission which negatively reflects on the contractor's quality, fitness, or capacity to perform a contract with the County or any other public entity, or engaged in a pattern or practice which negatively reflects on same; (3) committed an act or offense which indicates a lack of business integrity or business honesty; or (4) made or submitted a false claim against the County or any other public entity. (Ord. 2291, § 1, 01/07/2003)
- D. If there is evidence that the Contractor may be subject to debarment, the department will notify the Contractor in writing of the evidence which is the basis for the proposed debarment and will advise the Contractor of the scheduled date for a debarment hearing before the CHB (Contractor's Hearing Board). (Ord. 2291, § 1, 01/07/2003)
- E. The CHB will conduct a hearing where evidence on the proposed debarment is presented. The Contractor and/or the Contractor's representative shall be given an opportunity to submit evidence at that hearing. After the hearing, the CHB shall prepare a proposed decision, which shall contain a recommendation regarding whether the Contractor should be debarred, and, if so, the appropriate length of time of the debarment. If the Contractor fails to avail itself of the opportunity to submit evidence to the CHB, the Contractor may be deemed to have waived all rights of appeal. (Ord. 2291, § 1, 01/07/2003)

- F. A record of the hearing, the proposed decision and any other recommendation of the CHB shall be presented to the Board of Supervisors. The Board of Supervisors shall have the right to modify, deny or adopt the proposed decision and recommendation of the hearing board. (Ord. 2291, § 1, 01/07/2003)
- G. These terms shall also apply to subcontractors and subconsultants of County contractors. (Ord. 2291, § 1, 01/07/2003)

**APPENDIX A: CLAIMS RELATING TO PUBLIC CONTRACTS:**

**Public Contract Code - §9204** - Legislative findings and declarations regarding timely and complete payment of contractors for public works projects; claims process:

(a) The Legislature finds and declares that it is in the best interests of the state and its citizens to ensure that all construction business performed on a public works project in the state that is complete and not in dispute is paid in full and in a timely manner.

(b) Notwithstanding any other law, including, but not limited to, Article 7.1 (commencing with Section 10240) of Chapter 1 of Part 2, Chapter 10 (commencing with Section 19100) of Part 2, and Article 1.5 (commencing with Section 20104) of Chapter 1 of Part 3, this section shall apply to any claim by a contractor in connection with a public works project.

(c) For purposes of this section:

(1) "Claim" means a separate demand by a contractor sent by registered mail or certified mail with return receipt requested, for one or more of the following:

(A) A time extension, including, without limitation, for relief from damages or penalties for delay assessed by a public entity under a contract for a public works project.

(B) Payment by the public entity of money or damages arising from work done by, or on behalf of, the contractor pursuant to the contract for a public works project and payment for which is not otherwise expressly provided or to which the claimant is not otherwise entitled.

(C) Payment of an amount that is disputed by the public entity.

(2) "Contractor" means any type of contractor within the meaning of Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code who has entered into a direct contract with a public entity for a public works project.

(3)(A) "Public entity" means, without limitation, except as provided in subparagraph (B), a state agency, department, office, division, bureau, board, or commission, the California State University, the University of California, a city, including a charter city, county, including a charter county, city and county, including a charter city and county, district, special district, public authority, political subdivision, public corporation, or nonprofit transit corporation wholly owned by a public agency and formed to carry out the purposes of the public agency.

(B) "Public entity" shall not include the following:

(i) The Department of Water Resources as to any project under the jurisdiction of that department.

(ii) The Department of Transportation as to any project under the jurisdiction of that department.

(iii) The Department of Parks and Recreation as to any project under the jurisdiction of that department.

(iv) The Department of Corrections and Rehabilitation with respect to any project under its jurisdiction pursuant to Chapter 11 (commencing with Section 7000) of Title 7 of Part 3 of the Penal Code.

(v) The Military Department as to any project under the jurisdiction of that department.

(vi) The Department of General Services as to all other projects.

(vii) The High-Speed Rail Authority.

(4) "Public works project" means the erection, construction, alteration, repair, or improvement of any public structure, building, road, or other public improvement of any kind.

(5) "Subcontractor" means any type of contractor within the meaning of Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code who either is in direct contract with a contractor or is a lower tier subcontractor.

(d)(1)(A) Upon receipt of a claim pursuant to this section, the public entity to which the claim applies shall conduct a reasonable review of the claim and, within a period not to exceed 45 days, shall provide the claimant a written statement identifying what portion of the claim is disputed and what portion is undisputed. Upon receipt of a claim, a public entity and a contractor may, by mutual agreement, extend the time period provided in this subdivision.

(B) The claimant shall furnish reasonable documentation to support the claim.

(C) If the public entity needs approval from its governing body to provide the claimant a written statement identifying the disputed portion and the undisputed portion of the claim, and the governing body does not meet within the 45 days or within the mutually agreed to extension of time following receipt of a claim sent by registered mail or certified mail, return receipt requested, the public entity shall have up to three days following the next duly publicly noticed meeting of the governing body after the 45-day period, or extension, expires to provide the claimant a written statement identifying the disputed portion and the undisputed portion.

(D) Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the public entity issues its written statement. If the public entity fails to issue a written statement, paragraph (3) shall apply.

(2)(A) If the claimant disputes the public entity's written response, or if the public entity fails to respond to a claim issued pursuant to this section within the time prescribed, the claimant may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the public entity shall schedule a meet and confer conference within 30 days for settlement of the dispute.

(B) Within 10 business days following the conclusion of the meet and confer conference, if the claim or any portion of the claim remains in dispute, the public entity shall provide the claimant a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the public entity issues its written statement. Any disputed portion of the claim, as identified by the contractor in writing, shall be submitted to nonbinding mediation, with the public entity and the claimant sharing the associated costs equally. The public entity and claimant shall mutually agree to a mediator within 10 business days after the disputed portion of the claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. If mediation is unsuccessful, the parts of the claim remaining in dispute shall be subject to applicable procedures outside this section.

(C) For purposes of this section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.

(D) Unless otherwise agreed to by the public entity and the contractor in writing, the mediation conducted pursuant to this section shall excuse any further obligation under Section 20104.4 to mediate after litigation has been commenced.

(E) This section does not preclude a public entity from requiring arbitration of disputes under private

arbitration or the Public Works Contract Arbitration Program, if mediation under this section does not resolve the parties' dispute.

(3) Failure by the public entity to respond to a claim from a contractor within the time periods described in this subdivision or to otherwise meet the time requirements of this section shall result in the claim being deemed rejected in its entirety. A claim that is denied by reason of the public entity's failure to have responded to a claim, or its failure to otherwise meet the time requirements of this section, shall not constitute an adverse finding with regard to the merits of the claim or the responsibility or qualifications of the claimant.

(4) Amounts not paid in a timely manner as required by this section shall bear interest at 7 percent per annum.

(5) If a subcontractor or a lower tier subcontractor lacks legal standing to assert a claim against a public entity because privity of contract does not exist, the contractor may present to the public entity a claim on behalf of a subcontractor or lower tier subcontractor. A subcontractor may request in writing, either on his or her own behalf or on behalf of a lower tier subcontractor, that the contractor present a claim for work which was performed by the subcontractor or by a lower tier subcontractor on behalf of the subcontractor. The subcontractor requesting that the claim be presented to the public entity shall furnish reasonable documentation to support the claim. Within 45 days of receipt of this written request, the contractor shall notify the subcontractor in writing as to whether the contractor presented the claim to the public entity and, if the original contractor did not present the claim, provide the subcontractor with a statement of the reasons for not having done so.

(e) The text of this section or a summary of it shall be set forth in the plans or specifications for any public works project that may give rise to a claim under this section.

(f) A waiver of the rights granted by this section is void and contrary to public policy, provided, however, that (1) upon receipt of a claim, the parties may mutually agree to waive, in writing, mediation and proceed directly to the commencement of a civil action or binding arbitration, as applicable; and (2) a public entity may prescribe reasonable change order, claim, and dispute resolution procedures and requirements in addition to the provisions of this section, so long as the contractual provisions do not conflict with or otherwise impair the timeframes and procedures set forth in this section.

(g) This section applies to contracts entered into on or after January 1, 2017.

(h) Nothing in this section shall impose liability upon a public entity that makes loans or grants available through a competitive application process, for the failure of an awardee to meet its contractual obligations.

(i) This section shall remain in effect only until January 1, 2027, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2027, deletes or extends that date.

**APPENDIX B: CLAIMS EQUAL TO OR LESS THAN \$375,000:**

**Public Contract Code - §20104** - Application of article; provisions included in Plans and Specifications:

(a)(1) This article applies to all public works claims of three hundred seventy-five thousand dollars (\$375,000) or less which arise between a contractor and local agency.

(2) This article shall not apply to any claims resulting from a contract between a contractor and a public agency when the public agency has elected to resolve any disputes pursuant to Article 7.1 (commencing with §10240) of Chapter 1 of Part 2.

(b)(1) "Public work" means "public works contract" as defined in Section 1101 but does not include any work or improvement contracted for by the state or the Regents of the University of California.

(2) "Claim" means a separate demand by the contractor for (A) a time extension, (B) payment of money or damages arising from work done by, or on behalf of, the contractor pursuant to the contract for a public work and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled to, or (C) an amount the payment of which is disputed by the local agency.

(c) The provisions of this article or a summary thereof shall be set forth in the plans or specifications for any work which may give rise to a claim under this article.

(d) This article applies only to contracts entered into on or after January 1, 1991.

Public Contract Code - §20104.2 - Claims; requirements; tort claims excluded:

(a) The claim shall be in writing and include the documents necessary to substantiate the claim. Claims must be filed on or before the date of Final Payment. Nothing in this subdivision is intended to extend the time limit or supersede notice requirements otherwise provided by contract for the filing of claims.

(b)(1) For claims of less than fifty thousand dollars (\$50,000), the local agency shall respond in writing to any written claim within 45 Days of receipt of the claim, or may request, in writing, within 30 Days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the local agency may have against the claimant.

(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant.

(3) The local agency's written response to the claim, as further documented, shall be submitted to the claimant within 15 Days after receipt of the further documentation or within a period of time no greater than that taken by the claimant in producing the additional information, whichever is greater.

(c)(1) For claims of over fifty thousand dollars (\$50,000) and less than or equal to three hundred seventy-five thousand dollars (\$375,000), the local agency shall respond in writing to all written claims within 60 Days of receipt of the claim, or may request, in writing, within 30 Days of receipt of the claim, any additional documentation supporting the claim or relating to defenses to the claim the local agency may have against the claimant.

(2) If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of the local agency and the claimant.

(3) The local agency's written response to the claim, as further documented, shall be submitted to the claimant within 30 Days after receipt of the further documentation, or within a period of time no greater than that taken by the claimant in producing the additional information or requested documentation, whichever is greater.

(d) If the claimant disputes the local agency's written response, or the local agency fails to respond within the time prescribed, the claimant may so notify the local agency, in writing, either within 15 Days of receipt of the local agency's response or within 15 Days of the local agency's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issue in dispute. Upon a demand, the local agency shall schedule a meet and confer conference within 30 Days for settlement of the dispute.

(e) Following the meet and confer conference, if the claim or any portion remains in dispute, the claimant may file a claim as provided in Chapter 1 (commencing with §900) and Chapter 2 (commencing with §910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time the claimant submits his or her written claim pursuant to subdivision (a) until the time that claim is denied as a result of the meet and confer process, including any period of time utilized by the meet and confer process.

(f) This article does not apply to tort claims and nothing in this article is intended nor shall be construed to change the time periods for filing tort claims or actions specified by Chapter 1 (commencing with §900) and Chapter 2 (commencing with §910) of Part 3 of Division 3.6 of Title 1 of the Government Code.

Public Contract Code - § 20140.4 - Civil action procedures; mediation and arbitration; trial de novo; witnesses:

(a) Within 60 Days, but no earlier than 30 Days, following the filing or responsive pleading, the court shall submit the matter to nonbinding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within 15 Days by both parties of a disinterested third person as mediator, shall be commenced within 30 Days of the submittal, and shall be concluded within 15 Days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court or by stipulation of both parties. If the parties fail to select a mediator within the 15-Day period, any party may petition the court to appoint the mediator.

(b)(1) If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with §1141.10) of Title 3 of Part 3 of the code of Civil Procedure, notwithstanding § 1141.11 of that code. The Civil Discovery Act (Title 4 (commencing with §2016.010) of Part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.

(2) Notwithstanding any other provision of law, upon stipulation of the parties, arbitrators appointed for purposes of this article shall be experienced in construction law, and, upon stipulation of the parties, mediators and arbitrators shall be paid necessary and reasonable hourly rates of pay not to exceed their customary rate, and such fees and expenses shall be paid equally by the parties, except in the case of arbitration where the arbitrator, for good cause, determines a different division. In no event shall these fees or expenses be paid by state or county funds.

(3) In addition to Chapter 2.5 (commencing with § 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, any party who after receiving an arbitration award requests a trial de novo but does not obtain a more favorable judgment shall, in addition to payment of costs and fees under that chapter, pay the attorney's fees of the other party arising out of the trial de novo.

(c) The court may, upon request by any party, order any witnesses to participate in the mediation or arbitration process.

Public Contract Code - §20140.6 - Payment on undisputed portion of claim; interest on arbitration awards or judgments:

(a) No local agency shall fail to pay money as to any portion of a claim which is undisputed except as otherwise provided in the contract.

(b) In any suit filed under § 20104.4, the local agency shall pay interest at the legal rate on any arbitration award or judgment. The interest shall begin to accrue on the date the suit is filed in a court of law.

**END OF SECTION**



**SUPPLEMENTARY GENERAL CONDITIONS**

SGC 1. The California State Public Works Board (SPWB) and the Board of State and Community Corrections (BSCC) and their respective officers, agents, and employees shall be included as additional insured in all insurance required in GC 4. Insurance Requirements.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Contractor's use of site and premises.
- B. County-furnished, Contractor-installed (OFCl) items.
- C. County's occupancy requirements.
- D. Specification formats and conventions.

**1.2 CONTRACTOR'S USE OF SITE AND PREMISES**

- A. Coordinate use of the premises under the direction of the County.
- B. Assume full responsibility for the protection and safekeeping of materials, products, and equipment under this Contract, stored on the site.
- C. Move any stored materials, products, and equipment under Contractor's control which interfere with the operations of County or a separate contractor.
- D. Obtain and pay for the use of additional storage or work areas needed for Contractor's operations.
- E. Contractor shall be aware of and abide by the Humboldt County and local Noise Ordinance and County's noise prevention requirements. Contractor to verify County's requirements.

**1.3 COUNTY-FURNISHED AND CONTRACTOR-INSTALLED (OFCl) ITEMS**

- A. County-Furnished and Contractor-Installed (OFCl) Items: As indicated on the Drawings and Technical Specifications.
- B. County's Responsibilities:
  - 1. County will furnish products indicated. Schedule relocation of items with County.
  - 2. After relocation, County will inspect delivered items for damage, jointly with Contractor.
- C. Contractor's Responsibilities:
  - 1. Contractor is responsible for relocating, unloading, and handling County-furnished items at Project site.
  - 2. Contractor is responsible for protecting County-furnished items from damage during storage and handling, including damage from exposure to the elements.
  - 3. Contractor shall install and incorporate County-furnished items into the Work, as indicated and as required. Work includes providing support systems to receive County's equipment and making plumbing, mechanical, electrical connections, and miscellaneous work items associated with installation of County-furnished items.
  - 4. Contractor shall repair or replace County-furnished items damaged by Contractor's operations, as approved by County in writing.
  - 5. Contractor shall furnish and install fasteners and other accessories, as required for complete installation of County-furnished items.

**1.4 COUNTY'S OCCUPANCY REQUIREMENTS**

- A. County Occupancy: County will occupy the adjacent buildings on site, including parking areas with the exception of areas under construction and site areas agreed to with staff prior to construction for use by construction personnel , during the entire construction period to conduct normal operations.
- B. Cooperate with County to minimize conflicts, and to facilitate County's operations.
- C. Verify occupancy requirements with County, and schedule the Work to accommodate County's requirements.
- D. Maintain access to existing walkways and other adjacent occupied or used facilities. Do not close or obstruct walkways or other occupied or used facilities without written permission from County and authorities having jurisdiction.
- E. Provide not less than 72 hours' notice to County of activities that will affect County's operations.

**1.5 ENVIRONMENTAL MANAGEMENT**

- A. Spills: Contractor shall clean up all fluid spills caused by leaks in the equipment or generated while Contractor is performing the work under this Contract. Contractor shall provide drip catch pans for all equipment that drips or leaks oils or other fluids. Spills generated by Contractor's operation shall be cleaned up by Contractor at no cost to County.
- B. Dust and Noise Control:
  - 1. Precaution shall be exercised at all times to control dust and excessive noise created as a result of any operations during the construction period.
  - 2. If serious problems and/or complaints arise due to airborne dust and excessive noise, and when directed by the County, operations causing such problems shall be temporarily discontinued until a suitable remedy is established. The remedy shall be approved by the County before implementation, and shall be considered part of Contractor's normal effort to maintain safety and cleanliness without cause for further payment.

**1.6 MATERIALS AND WORKMANSHIP**

- A. Except as otherwise specified all materials and equipment incorporated in the Work under the Contract shall be new. All workmanship shall be first-class and by persons qualified in the respective trades.

**1.7 ACCIDENT PREVENTION AND PROTECTION OF LIVES AND HEALTH**

- A. Precaution shall be exercised at all times for protection of all personnel and occupants, including employees of Contractor, County, and property.
- B. The California Department of Industrial Relations, Division of Occupational Safety and Health (DOSH, also known as Cal/OSHA) requirements for safety and health protection of workers and public apply. Other requirements not covered by Cal/OSHA, shall be in accordance with U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) requirements.
- C. Comply with safety requirements of CCR, Title 8, Division 1, Chapter 4, "Division of Industrial Safety," and Title 8, Division 1, Chapter 3.2, "Cal/OSHA Regulations"; CCR, Title 24, CBC;

and other applicable building and construction codes. Machinery, equipment, openings, power lines, and all other safety hazards shall be guarded or eliminated in accordance with safety requirements of Title 8, and Manual of Accident Prevention in Construction published by the Associated General Contractors of America.

- D. Comply with any applicable Federal, State or Local public health orders in response to new or ongoing health pandemics, endemics or public health emergencies. Should any orders be in-place prior to, or made during the course of the Work, Contractor shall prepare and submit no later than five (5) days after it receives notice from Owner that it will be awarded a contract for the project, or within five (5) days after such order is made during the course of the Work as a condition precedent to mobilizing to the project site or continuing construction, an Exposure Prevention, Preparedness and Response Plan specific to this project that describes how to prevent worker exposure to coronavirus or other biological agent, protective measures to be taken on the jobsite, personal protective equipment and work practice controls to be used, cleaning and disinfecting procedures, and what to do if a worker(s) shows symptoms of pandemic or endemic related illness or tests positive for such biological agents. Contractor's Plan shall be consistent with and prepared in conjunction with any similar plans issued by Owner and if such plans or similar requirements impose greater obligations on Contractor, Contractor shall comply with same and revise its plan accordingly unless directed otherwise in writing by Owner. The Contractor should review the latest OSHA Workplace Safety Guidance documents that may be available in response to active pandemics or endemics (<https://www.osha.gov>) as a resource in preparation of its Site Specific Health and Safety Plan

## **1.8 UTILITIES**

- A. Excavation at the Project site requires a call to Underground Service Alert North (USA North), 811 or by internet at <http://usanorth811.org>.
1. Contractor shall call USA North at least 7 days prior to commencing excavation work. Obtain a ticket number and confirm service date for marking underground facilities (utilities).
  2. Prior to placing the call, Contractor shall mark the outline of excavation with white chalk, white paint, or stakes, to enable representatives (locators) of USA North members to map the area for existing underground facilities (utilities).
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by County or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
1. Notify the County not less than three days in advance of proposed utility interruptions.
  2. Obtain County's written permission before proceeding with utility interruptions.
- C. Provide necessary protection to existing utility services and repair work damaged as a result of operations under this Contract.

## **1.9 PROTECTION OF EXISTING FACILITIES**

- A. Contractor shall take appropriate measures to prevent damage to existing facilities, site work, landscaping, and adjoining property. Should damage occur, such facilities, site work, landscaping, and property shall be restored to original condition, at no cost to County.
1. Contractor shall arrange for protection of existing buildings at all times. Contractor shall furnish, install, and maintain, necessary barricades, temporary coverings, etc., as required for protection, and remove them at completion of the Work. When all Work is complete, damaged areas of the premises shall be restored to original undamaged condition that existed prior to installation of temporary protection.
- B. Housekeeping: The premises shall be kept in a clean, safe condition at all times. Rubbish

shall be removed as fast as it accumulates, but not less than one time per day.

- C. Burning: Burning of refuse, debris, and construction waste at Project site will not be permitted.

#### **1.10 OVERLOADING**

- A. Contractor shall not overload any part or parts of structures beyond their safe calculated carrying capacities by placing materials, equipment, tools, machinery or any other item thereon. No loads shall be placed on floors or roofs before they have attained their permanent and safe strength.

#### **1.11 MANUFACTURER'S INSTRUCTIONS**

- A. Where required in the Specifications that materials, products, equipment, and processes be installed or applied in accordance with manufacturer's instructions, directions, or specifications, or stated in words to that effect, it shall be construed to mean that said installation or application shall be in strict accordance with printed instructions furnished by manufacturer of the specified item and is suitable for use under conditions similar to those at the jobsite. Three copies of such instructions shall be included in the applicable submittal and furnished to the County for review. Obtain County's acceptance prior to commencement of the Work.

#### **1.12 RESPONSIBILITY FOR THEFT AND DAMAGE**

- A. County will not be responsible for the loss or theft of Contractor's tools, equipment and materials.

#### **1.13 FIRE PROTECTION**

- A. Contractor shall at all times maintain good housekeeping practices to reduce the risk of fire and water damage. All scrap materials, rubbish and trash shall be removed daily from jobsite, inside and around the buildings or structures, as applicable, and shall not be scattered on adjacent property.
- B. Suitable storage space shall be provided outside immediate building areas during construction for temporary storage of flammable materials and paints, as required by CFC Chapter 14 and NFPA 241. Excess flammable liquids being used inside the building shall be kept in closed metal containers and be removed from the building during unused periods.
- C. Contractor shall provide temporary fire extinguishers during construction in accordance with the recommendations of CBC Chapter 33, CFC Chapter 14, and NFPA 10 and Bulletin No.241. However, in all cases a minimum of one fire extinguisher shall be available for use.
- D. Under provisions of CFC Chapters 14 and 26, provide a fire extinguisher at each location where cutting, soldering, or welding is being performed. Where electric or gas welding or cutting work is done, interposed shields of noncombustible material shall be used to protect against fire damage due to sparks and hot metal. When temporary heating devices are used, a watchman shall be present to cover periods when other workmen are not on the premises.

#### **1.14 EMERGENCY CONDITIONS**

- A. Emergency condition shall be any condition at the Project site which has the actual or potential for significant adverse effects to persons or property, whether or not resulting from Contractor's operations.

- B. Immediate action shall be taken by Contractor by whatever means necessary to alleviate the condition and to prevent damage or injury to persons or property. County shall be notified of the existence of such a condition, but shall not be called upon to perform emergency service.
- C. County may not respond to the emergency condition, which shall not be used as an excuse by Contractor to neglect immediate action; County will not be responsible or liable for any resulting conditions. Absence of Contractor's Representative during emergency conditions at jobsite shall not relieve Contractor from contractual responsibility of providing an immediate response to the situation, for restoration of conditions to normalcy.
- D. If the emergency conditions are not caused by Contractor's fault or neglect, the Contract Sum shall be adjusted to reflect the actual direct field costs of labor and materials to perform and complete emergency measures.
- E. The Contract Time shall also be adjusted to reflect the actual direct effect of such actions to the then critical path of the Construction Progress Schedule. The foregoing notwithstanding, adjustments of the Contract Sum or the Contract Time for actions taken by Contractor in response to emergency circumstances shall be subject to Contractor's strict compliance with all other applicable provisions of the Contract Documents relating to notices and time for delivery of notices.

**1.15 SPECIFICATION FORMATS AND CONVENTIONS**

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 48-division format and numbering system of CSI "MasterFormat, 2016 Edition.
- B. Division 01 Sections govern the execution of the Work of all Sections in the Specifications.
- C. Specifications Conventions: Singular words shall be interpreted as plural and plural words shall be interpreted as singular, where applicable, as the context of the Contract Documents indicates.
- D. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Coordination of construction operations.
- B. Field engineering.
- C. Electronic File Availability

**1.2 COORDINATION**

- A. Coordinate scheduling, submittals and Work of various Sections of the Contract Documents to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. In the event of discrepancy, immediately notify the County. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.
- C. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing operating equipment in service.
- D. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for installation of other Work, maintenance work, and repair work.
- E. Do not use spray paint or indelible ink markers for layout on concrete floor slabs scheduled to receive sealed concrete, stained concrete, vinyl, linoleum, or rubber flooring.
- 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 cleanup of Work of separate Sections in preparation for Final Completion.
- H. After beneficial occupancy of premises by the County, coordinate access to site for correction of defective Work and Work not complying with the Contract Documents, and to minimize disruption of County's activities.

**1.3 FIELD ENGINEERING**

- A. Employ Land Surveyor registered in the State of California and acceptable to the County.
- B. Locate and protect survey control and reference points. Promptly notify the County of discrepancies discovered.
- C. Control datum for survey is as shown on Drawings.
- D. Verify setbacks and easements; confirm Drawing dimensions and elevations.
- E. Provide field-engineering services. Establish elevations, lines, and levels, utilizing

recognized engineering survey practices.

- F. Submit copies of site drawing and certificate signed by Land Surveyor certifying elevations and locations of the Work are in conformance with the Contract Documents.
- G. Maintain complete and accurate log of control and survey work as Work progresses.
- H. On completion of foundation walls and major site improvements, prepare certified survey illustrating dimensions, locations, angles, and elevations of construction and site work.
- I. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- J. Promptly report to the County loss or destruction of reference point or relocation required because of changes in grades or other reasons.
- K. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to the County.

#### **1.4 UTILITIES AND IRRIGATION LINES**

- A. Send proper notices, make necessary arrangements, perform other services required in construction, care and maintenance of all utilities and irrigation lines, and assume all responsibility concerning the same. Provide necessary protection to existing utility services and irrigation lines as directed, and repair any work damaged as a result of operations of the Contract.

#### **1.5 COMPLIANCE WITH CODE OF REGULATIONS**

- A. All work and materials on this project shall be in compliance with the rules and regulations as set forth in the Title 24, CCR Parts 1 – 6, 9, and 12 which shall be kept continuously at the site of the Work until completion and final acceptance.

#### **1.6 PROJECT COORDINATION**

- A. If, because of the non-related sizes of various materials and locations of existing utilities and conditions, etc., it is not possible to accomplish the Work as shown, Contractor shall meet with County at the site to determine the most satisfactory arrangement. Contractor shall establish lines and grades for all trades.

#### **1.7 INTEGRATING EXISTING WORK**

- A. All adjoining existing Work shall be protected from damage of any type due to or by Contractor's operations, equipment, and workmen during the Contract period.

#### **1.8 ELECTRONIC FILE AVAILABILITY**

- A. Architect's electronic drawing files for this project will be available to Contractor upon written request. The request shall include the drawing sheet number of each drawing being requested. Architect shall respond to the written request using the Delivery of Electronic Files Agreement Form attached at the end of this Section. Contractor shall sign and date the form, return it to Architect prior to the electronic files being delivered to Contractor.



**NICHOLS, MELBURG & ROSSETTO  
ARCHITECTS**

**SECTION 01 30 00  
ADMINISTRATIVE REQUIREMENTS**

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**Terms and Conditions for  
Delivery and Use of Electronic Media/Electronic Media Disclaimer**

<p><b>Project:</b> _____</p> <p><b>NMR Project No.:</b> _____</p> <p><b>Electronic Media being delivered:</b> _____</p> <p>_____</p>
--

This Agreement is made by and between Nichols, Melburg & Rossetto, Architects (hereinafter referred to as NMR) and the company identified below (hereinafter referred to as Recipient) relative to the delivery and use of electronic media for the subject project:

1. The electronic media files of selected portions of the subject project are being provided to the Recipient by NMR for use by the Recipient and Its Subcontractors in the preparation of shop drawings, coordination drawings, and related submittals specific to the subject project. The electronic media files may be used only on the subject project. No other use by the Recipient, Its Subcontractors, or others is permitted by this Agreement.
2. The delivery of these electronic media is a courtesy of NMR, on behalf of and at the request of the Recipient. In accepting and utilizing any drawings or other data on any form of electronic media generated and provided by NMR, Recipient agrees that all such drawings and data are instruments of professional service of NMR, and shall remain the property of NMR. In addition, NMR shall be deemed the author of the drawings and data, and shall retain all common law, statutory law and other rights, including copyrights.
3. The requirements of the Contract Documents for the subject project are in no way changed or modified by providing the Recipient with the electronic media files for the subject project.
4. Recipient agrees that NMR shall not be held responsible for notification to Recipient of changes, updates, or other project-related modifications that may occur after release of electronic media.
5. Electronic media drawing files, data, and other instruments of service provided by NMR contain proprietary electronic data that is provided as a convenience only. The information contained on these files shall not be "scaled" or "measured" for dimensions. All factual information shall be derived from the latest issued hard copy Contract Documents. Because NMR has no control over damage or alteration of this electronic data, it is understood that Recipient accepts all risks for its use. This data, or any part thereof, shall not be translated or reproduced in any form without the express written permission of NMR.
6. In using, modifying, or accessing information from the electronic media, Recipient is responsible for confirmation, accuracy, and checking of the data from the electronic media against data contained in the latest issued hard copy Contract Documents, as well as actual field conditions and dimensions. These electronic media are instruments of service and not a product, and any party using them shall independently verify the information contained therein. NMR does not warrant or guarantee that the electronic media files are completely accurate or free of errors.
7. Recipient agrees not to use these electronic media, in whole or in part, for any purpose or project other than the subject project. Recipient agrees to waive all claims against NMR and the County of Humboldt and all other design professionals and consultants working under consulting agreements with NMR on the subject project resulting in any way from any unauthorized use or reuse of, or changes to, these electronic media by anyone other than NMR.
8. Recipient acknowledges that use of information contained in these electronic media is at the Recipient's sole risk, and without liability, risk, or legal exposure to NMR and the County of Humboldt. Furthermore, Recipient shall, to the fullest extent permitted by law, defend, indemnify, and hold

harmless the County of Humboldt, NMR, its officers, directors, shareholders, employees, and all design professionals and consultants working under consulting agreements with NMR on the subject project, from and against any and all claims, demands, liabilities, losses, damages, penalties, and costs of any kind, including attorney's fees and costs of defense, arising out of or in any way connected with the use, reuse, modification, misrepresentation, or misuse by Recipient or third party of the electronic media provided by NMR. The foregoing indemnification also applies, without limitation, to any use of the electronic media for completion of the subject project by others, or additions to the subject project, excepting only such use as may be authorized in writing by NMR.

9. Under no circumstances shall the transfer of these electronic media for use by the Recipient and Its Subcontractors be deemed a sale by NMR, and NMR makes no warranties, either express or implied, of merchantability and fitness for any particular purpose.
10. Whenever the electronic media files are used by the Recipient's Subcontractor(s), Recipient shall communicate the contents of this Agreement in its entirety to said Subcontractor(s), and shall hold said Subcontractor(s) to all conditions noted herein for use of the electronic media. Distribution of the electronic media to Recipient's Subcontractor(s) shall be done through the Recipient. Any and all inquiries from Recipient's Subcontractors related to these electronic media shall be routed through Recipient.

Please acknowledge your acceptance of these conditions by signing below and returning the original to NMR.

Submitted By: \_\_\_\_\_ Recipient: \_\_\_\_\_

By: \_\_\_\_\_ By: \_\_\_\_\_  
Printed Name / Title Printed Name / Title

Signed: \_\_\_\_\_ Signed: \_\_\_\_\_  
Authorized Signature Authorized Signature

Date: \_\_\_\_\_ Date: \_\_\_\_\_

**END OF SECTION**

## PART 1 GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
    - a. General coordination procedures.
    - b. Coordination drawings.
    - c. Project Meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

### 1.2 SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. This list shall include all subcontractors including those with work of a value less than one-half of one percent of the agreement price. Include the following information in tabular form:
  - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
  - 2. Number and title of related Specification Section(s) covered by subcontract.
  - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project Site. Identify individuals and the duties and responsibilities; list address, telephone numbers, (Home, office, and cellular) and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
  - 1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

### 1.3 COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include items as required notices, reports, and list of attendees at meetings.
  - 1. Prepare similar memoranda for Owner and separate contractors if coordination of the Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative

procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
  2. Preparation of the schedule of values.
  3. Installation and removal of temporary facilities and controls.
  4. Delivery and processing of submittals.
  5. Progress meetings.
  6. Pre-installation conferences.
  7. Project closeout activities.
  8. Startup and adjustment of systems.
  9. Coordinating inspections and other jurisdictional requirements.
  10. Coordinate OFCI equipment.
  11. Action items and issue logs.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to the Specifications Sections for disposition of salvaged materials that are designated as Owner's property.

#### **1.4 COORDINATION DRAWINGS**

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
    - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    - b. Coordinate the addition of trade specific information to the coordination drawings by multiple contractors in sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
    - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
    - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
    - f. Indicate required installation sequences.
    - g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately

- represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures, ductwork, piping, and other components.
  3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire-alarm, and electrical equipment.
  4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
  5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
  6. Mechanical and Plumbing Work: Show the following:
    - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    - c. Fire-rated enclosures around ductwork.
  7. Electrical Work: Show the following:
    - a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
    - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
    - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
    - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
    - e. Floor boxes.
  8. Fire Protection System: Show the following:
    - a. Locations of standpipes, mains piping, branch lines, pipe drops, sprinkler heads, and inspector test locations.
  9. IDF/MDF Rooms: Communications and low voltage (security, data, phone, etc.) audio
  10. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
  11. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 33 00 Submittal Procedures.
- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
  2. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format.
  3. BIM File Incorporation: Develop and incorporate coordination drawing files into Building Information Model established for Project.
    - a. Perform three dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
  4. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
    - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
    - b. Digital Data Software Program: Drawings are available in Revit.

- c. Contractor shall execute a data licensing agreement in the form of AIA Document C106.

## 1.5 PROJECT MEETINGS

- A. Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
  1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
  2. Agenda: Owner's Representative to prepare the meeting agenda and distribute the agenda to all invited attendees.
  3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
  4. Action Items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.
  5. Issue logs: Documentation element of software project management and contains a list of ongoing and closed issues of the project.
  
- B. Kick-off & Preconstruction Conference: Owner's Representative will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect.
  1. Conduct the conference to review responsibilities and personnel assignments.
  2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Particular emphasis should be on:
    - a. Functions and authority of personnel
    - b. Regularly scheduled progress meetings
    - c. Submittals/shop drawings
    - d. Requests for Information
    - e. Field Orders
    - f. Payment Applications
    - g. Progress Schedules
    - h. Safety and Job Site Security
    - i. Change Order procedures
    - j. Subcontractors
    - k. Disputes
    - l. Quality Control
    - m. Coordination of contractors
    - n. Access and use of site.
  4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
  5. Action Items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.
  
- C. Pre-installation Conferences: Conduct a pre-installation trade conference at site before each construction activity that requires coordination with other construction trades.
  1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Engineer of Record of scheduled meeting dates.
  2. Agenda: Contractor to review progress of other construction activities and preparations

- for the particular activity under consideration.
3. Contractor to record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  4. Reporting: Contractor to distribute minutes of the meeting to each party present and to other parties requiring information.
  5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
  6. Action Items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.
- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Substantial Completion.
  2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect or delay Project closeout.
  4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
  5. Action Items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.
- E. Progress Meetings:
1. Attendees will include the Owner's Representative, Owner's Project Administrator, the Contractor, and the Lead Consultant. Scheduled invited Attendees will include the Architect and sub-consultants, subcontractors, and other owner personnel.
  2. The Project Administrator will prepare an agenda with content lead from the Contractor (which usually is derived from the previous meeting minutes) for discussion at these meetings. The agenda should include a list of outstanding item, which will be reviewed as appropriate. As a minimum the following will be discussed:
    - a. Construction Status
    - b. Schedule
      - i. Critical Path Activities
      - ii. Job site problems and conflicts
      - iii. Upcoming Activities
      - iv. Completion Date
      - v. Time Extension Requests
    - c. Submittals/shop drawings
    - d. Requests for Information
    - e. Field Orders
    - f. Cost Proposals
    - g. Change Orders
    - h. Safety and Security
    - i. Claims
    - j. Quality Control
  3. The Project Administrator will record and distribute minutes of the meeting to all attendees in a timely manner in order to allow review before the next regularly scheduled meeting.
  4. In addition to the ongoing items of discussion listed above, time should be reserved to review any unresolved issues. Any representative attending the meeting may introduce



these. Control logs for RFI's, submittals, and Cost Proposals should be discussed in the meeting.

F. Pay Request Meetings:

1. A regularly scheduled monthly meeting to review the pay request will be established.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

**PART 1 GENERAL**

1.1 SUMMARY

- A. General: This Section specifies administrative and procedural requirements for the critical path method (CPM) of scheduling and reporting progress of the Work.

1.2 DESCRIPTION

- A. Requirements for CPM scheduling are included to insure adequate planning and execution of the Work and to assist the County in evaluating progress of the Work economically and chronologically.
- B. The Contractor shall be solely responsible for establishing the schedule for the Work and shall be responsible for such schedule to be consistent with meeting the contract milestone, intermediate milestones, and completion dates as established by the County.
  - 1. The Contractor shall develop a CPM Schedule demonstrating fulfillment of all contract requirements. The project schedule shall be kept current to be utilized for scheduling, coordinating, monitoring work progress, and for preparation of the monthly payment application for payment under this Contract including all Work of Subcontractors and equipment and material suppliers.
  - 2. Schedule shall include activities pertaining to long lead delivery items, fabrication items and submittal of shop drawings and product samples, and any items critical to maintaining all activities in the CPM.
- C. Contractor shall designate a scheduler who is trained and experienced in compiling construction scheduling data, in analyzing scheduling data by use of CPM, and in the preparation and issuance of periodic reports as required herein. The Contractor's Scheduling Representative shall have direct control and complete authority to act on behalf of the Contractor in fulfilling all project schedule requirements.

1.3 QUALITY ASSURANCE

- A. The following publication is cited as reference for CPM and scheduling techniques utilized in this Contract:

J.J. Moder & C.R. Phillips, Project Management with CPM & Pert.  
New York: Reinhold Publishing Corp.

1.4 INITIAL CONSTRUCTION SCHEDULE

- A. Pre-Construction Scheduling Conference: The Contractor and County shall conduct a pre-construction scheduling conference with the Contractor's Project Manager and Construction Scheduler within five calendar days of the Notice to Proceed.
  - 1. The Contractor shall submit a general time-scaled logic diagram displaying the major activities and sequence of planned operations and shall be prepared to discuss the proposed work plan and schedule methodology that comply with the requirements of these special provisions . Contractor shall submit the alphanumeric coding structure and the activity identification system for labeling the Work activities.
  - 2. The County will review the logic diagram, coding structure, and activity identification system, and provide required baseline schedule changes to the Contractor for implementation.
- B. Within 10 calendar days after Notice to Proceed and prior to submission of the first payment request, the Contractor shall submit to the County an Initial Construction Schedule – two hard copies and an electronic copy. The Initial Construction Schedule shall reflect the following information:
  - 1. Procurement, submittals, construction drawings, shop drawings, approvals, fabrication and delivery of all major and long lead equipment and material items.

2. Work expected to occur within the first 90 calendar days of the project, consistent with meeting all established milestone and completion dates.
  3. The Initial Schedule shall be descriptive of the work to be performed so that the Contractor and County can easily monitor progress of the Work. All work activities shall be cost loaded and will be the basis for payment during the beginning months of the project. All activities shall be coded to align with the approved Schedule of Values.
- C. Within 15 calendar days after receipt of the Initial Construction Schedule, the County will notify the Contractor of the acceptance or non-acceptance of the Initial Construction Schedule. In the event of disapproval, the Contractor shall resubmit the schedule within seven calendar days. No progress payments will be made for work in progress or completed until the Initial Construction Schedule is accepted.

**1.5 CONSTRUCTION SCHEDULE**

- A. The CPM Schedule to be prepared by the Contractor pursuant to this section will be a part of a total system for scheduling, reporting work progress, and preparing the monthly payment application.
1. Within 30 calendar days after the Notice to Proceed, the Contractor shall submit to the County the complete project schedule. In the event the complete project schedule is disapproved, the Contractor shall resubmit a corrected schedule within 15 calendar days after the notice of disapproval is received by the Contractor.
  2. Should the Contract Schedule not be accepted within 90 calendar days after Notice to Proceed, the Contractor may be due provisional progress payments(s) on work performed, based on the Initial Construction Schedule. It is the responsibility of the Contractor to reconcile such cost information and payments with the Contract Schedule. However, no payment shall be approved after the 90 calendar day period, until the Contract Schedule has been accepted by the County.
  3. All activities in the Official Contract Schedule shall have sufficient code structure to enable a sort by activity code, or "rollup" of the activities in the form of a Summary Schedule. The code structure will allow sufficient sorting capabilities to group by: responsibility (by subcontractor), location (building, floor, area, etc.), type (submittal, approval, change, etc), milestones, CSI division, etc.
  4. The approved Initial Construction Schedule shall be incorporated into the final Contract Schedule and shall represent the initial 90 calendar days of the Contract Schedule.
  5. The Schedule shall be a cost, and manpower resource-loaded CPM schedule. Mobilization (not to exceed 1/2 of 1 percent), bond, insurance and demobilization (equivalent to the mobilization amount) costs shall be shown separately; however, other general requirement costs, overhead, profit, etc., shall be prorated throughout all the activities. The cost-loaded activities of the Initial Contract Schedule shall be from the Schedule of Values line items and shall be the basis for establishing the distribution of costs within the Schedule of Values. Costs relating to each activity shall be distributed evenly over the duration of the activity.
  6. The initial submittal of the Contract Schedule shall not reflect contract changes or delays. These changes shall be added within the first Schedule Revision.
  7. The Contract Schedule shall include, in addition to construction activities, the following:
    - a. The submittal and approval of construction drawings, shop drawings and materials, the procurement, fabrication, delivery, and testing of major materials and equipment, and their installation and testing.
    - b. Include activities/task items for "Pre-Installation Meetings" as required by the Specs to precede work.
    - c. Contract requirement dates of all or parts of the Work will be shown including all activities of the County that affect the progress of the Work.
    - d. Activities of completed work ready for use by next trade, etc.

- e. Activities relating to different areas of responsibility, such as sub-contracted work which is distinctly separate from that being done by Contractor directly.
  - f. Different categories of work as distinguished by craft or crew requirements.
  - g. Different categories of work as distinguished by materials.
  - h. Distinct and identifiable subdivisions of work such as structural excavation, structural slabs, masonry walls, beams, columns, etc.
  - i. Location of work within the project that necessitates different times or crew to perform.
  - j. Outage schedules of limiting times that existing utility services may be interrupted to construct the Project.
  - k. Items listed separately in Schedule of Values for payment purposes. All activities shall be coded to align with the approved Schedule of Values.
  - l. Acquisition and installation of equipment and materials supplied and/or installed by County or separate contractors.
  - m. Material stored on site.
8. Major Equipment/Materials: For all major equipment and materials fabricated or supplied for Project, Construction Schedule shall show a sequence of activities including:
- a. Preparation of shop drawings and sample submissions.
  - b. Time required to obtain special inspection certifications and additional permits or certifications that may be required for specific tasks and/or systems.
  - c. Review of shop drawings and samples.
  - d. Shop fabrication, delivery, and storage.
  - e. Erection or installation.
  - f. Test of equipment and materials.
  - g. Required dates of completion.
9. Early Completion: Include in Construction Schedule an early completion date for the Project that is no earlier than Project's required date of completion.
10. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
11. Construction activities are to be delineated separately for off-site sewer, site development, earthwork, utilities, and like work.
12. The time-scaled logic diagrams shall clearly indicate any work that is planned to be accomplished on a work schedule other than eight hours per day and 40 hours per week.
13. The CPM schedule shall show the order in which the Contractor proposes to carry out the Work with logical links between time-scaled work activities, and calculations made using the CPM to determine the controlling operation(s). The Contractor is responsible for assuring that all activity sequences are logical and that each schedule shows a coordinated plan for complete performance of the Work.
14. The basic concept of CPM time-scaled logic diagramming will be followed to show how the start of a given activity is dependent on the completion of preceding activities and its completion restricts the start of following activities. The diagrams shall show a continuous flow from left to right with no right to left sequences. The CPM schedule shall be based on early start and early finish dates of activities, and clearly show the primary paths of criticality using time scaled logic graphical presentation.
15. The number of activities shall be sufficient to assure adequate planning of the project, to permit monitoring and evaluation of progress, and to do an analysis of time impacts. Schedule activities shall include the following:
- a. A clear and legible description.

- b. Start and finish dates
  - c. A duration of not less than one working day, except for event activities, nor more than 15 working days in duration, except for passive activities such as concrete curing, or as otherwise authorized by the Project Manager, for any operation. All Humboldt County recognized holidays and non-working days shall be identified by way of calendar designations.
  - d. At least one predecessor and one successor is required for each activity, except for the project start and finish milestones.
  - e. All required constraints.
  - f. Codes for responsibility, stage, work shifts, location, and contract pay items.
16. All activities shall be linked by realistic logical relationships only. Other type of relationships shall be permitted but shall be minimized (including, but not limited to: start-to-start, finish-to-finish, and start-to-finish relationships).
17. The Schedule shall include the entire scope of work and show how the Contractor plans to complete the Work. The schedule shall show the activities that define the critical path. Multiple critical paths will not be accepted. A total of no more than 25 percent of the baseline schedule activities shall be critical or near critical, unless otherwise authorized by the County. Near critical is defined as float less than 10 days.
18. The Official Contract Schedule shall not extend beyond the number of calendar days specified in the Contract. The baseline schedule shall have a data date of the first working day of the contract and not include any completed work to date. The baseline schedule shall not attribute negative float or negative lag to any activity.
19. The following information will be provided in a report for each network activity:
- a. Data Date
  - b. Activity number and description.
  - c. Activity duration in work days.
  - d. Activity cost. The Contract Price shall be broken down with the appropriate values distributed to the network diagram activities, coded to align with the approved Schedule of Values.
  - e. Working activities and General Conditions activities shall be identified separately.
  - f. Activity predecessors and successors.
  - g. Activity codes
  - h. Activity logic ties.
  - i. Scheduled, or actual and remaining durations (work days) for each activity.
  - j. Earliest Start and Earliest Finish Dates (calendar).
  - k. Actual Start and Actual Finish Dates (calendar).
  - l. Latest Start and Latest Finish Dates (calendar).
  - m. Free Float and Total Float (work days)
  - n. Percentage of activity complete and remaining duration for incomplete activities.
  - o. Lags.
  - p. Required Constraints.
20. In addition to the information above, identify the adverse weather days anticipated per each month. Meteorological data for the area shall be based on historical information. An "Adverse Weather Day" will be days exceeding the average number of days per month when precipitation exceeds 0.1 inches based on NOAA Data.

21. Schedule review by the County and its agents is limited to ensuring the logic of sequencing is reasonable and Contractor has demonstrated ability to meet contractual milestone and completion dates. Acceptance of schedule shall not be construed as direction from the County to Contractor on how to schedule the Work.
22. Subsequent to acceptance of the contract (baseline) schedule, the Contractor will provide four copies of the network diagrams, plus four copies of all supporting documents (Contract Price, Schedule of Values, breakdown, etc.), as well as electronic copies of the network diagrams and supporting documents. Monthly update data will be submitted in the same form and numbers. Size of network diagrams shall be on sheets 34-inch x 44-inch, and include a title block, timeline, and run date on each page, as approved by the County.
23. After Completion and Acceptance of the Official Contract Schedule, the Contractor will provide computer reports and weekly and monthly reports thereafter.
24. Adverse weather will not be considered as a reason for delay, unless the number of days per a specific month exceed the normal adverse weather days of that month.

#### 1.6 UPDATE SCHEDULES

- A. The Contractor shall submit an Update Schedule – hard copy and electronic copy -- and meet with the County to review progress, before the first day of each month, beginning one month after the Baseline Schedule is accepted. The Contractor shall allow 1 week for the County to review the updated schedule and all supporting data, except that the review period shall not start until the previous month's required schedule is accepted.
  1. The Update Schedule shall have a data date of the end of the month or other date established by the County. The Update Schedule shall show the status of work actually completed to date and the Work yet to be performed as planned. Actual activity start dates, percentage complete, and finish dates shall be shown. Actual durations for work that has been completed shall be shown on the Update Schedules for when the work actually occurred, including submittal reviews and contractor re-submittal times.
  2. The Contractor may include modifications such as adding or deleting activities or changing activity constraints, durations, or logic that do not: (1) alter the critical path(s) or near critical path(s), or (2) extend the schedule completion date compared to that shown on the current accepted schedule. The Contractor shall provide a narrative in writing that states the reasons for any changes to the planned work. If any proposed changes in planned work will result in (1) or (2) herein, then Contractor shall submit a time impact analysis as described herein.
  3. Any request for an adjustment of the Contract Time for completion submitted by Contractor for changes or alleged delays shall be accompanied by a complete Time Impact Analysis, (TIA), which shall be submitted for review within 15 days after the initial request for time by Contractor, or the impacting incident, whichever comes first.
  4. Schedule Reports: Initial and subsequent Update Schedule Reports will contain the following minimum information for each activity and shall be produced at a minimum of once a month:
    - a. Data date
    - b. Activity Number and Description;
    - c. Predecessor and successor activity numbers and descriptions;
    - d. Activity Codes;
    - e. Scheduled, or actual and remaining durations for each activity;
    - f. Earliest start and finish (calendar) dates;
    - g. Actual start and finish (calendar) dates;
    - h. Latest start and finish (calendar) dates;
    - i. Free and total float (work days)

- j. Percentage of each activity completed and remaining duration for incomplete activities as of each report;
  - k. Remaining float/days behind schedule;
  - l. Responsibility for activity;
  - m. Current status of activity as compared to baseline schedule.
5. Cost Reports: Initial and subsequent update Cost Reports will include the following information for each activity, sorted by trade activity:
- a. Activity Number and Description;
  - b. Activities coded to approved Schedule of Values.
  - c. Percentage of value of Work in place against total value;
  - d. Total cost of each activity;
  - e. Value of Work in place since last report;
  - f. Value of Work in place to date;
  - g. Value of incomplete Work.
6. Narrative Reports: Monthly Narrative Reports shall contain the following information for each monthly update:
- a. Description of overall project status
  - b. Description of problem areas (referenced to pending change orders as appropriate)
  - c. Current and anticipated delays not resolved by approved change order, including:
    - 1) Cause of the delay
    - 2) Corrective action and schedule adjustments to correct the delay
    - 3) Known or potential impact of the delay on other activities and milestones.
    - 4) Changes in the construction sequence
  - d. Pending items and status thereof, including but not limited to:
    - 1) Pending Change Orders
    - 2) Time Extension Requests
    - 3) Other Issues relating to Contract Time
  - e. Contract Completion Date status:
    - 1) If ahead of schedule, the number of calendar days ahead
    - 2) If behind schedule, the number of calendar days behind.
7. Three-Week Window: Weekly, for the progress meeting, the Contractor shall produce a three-week window of the current schedule, indicating activities scheduled for the current and following two week period.
8. Payment Progress Reporting: County and Contractor shall select a specified time for updating the Project Schedule at the jobsite each month.
- a. The County and Contractor and his/her designated scheduling representatives will attend the meeting to review the project progress.
  - b. The schedule shall be the basis for monthly pay requests derived from the joint review of the cost loaded schedule.
  - c. All progress and status information provided by the Contractor shall clearly define the reporting period for which the status is provided.

9. At the monthly progress review meeting, the Contractor will provide "actual start" and "actual completion" dates for activities that were started or completed during the reporting period. The Contractor and the Project Manager will agree upon and assign percent complete values to activities in progress. In the event of a disagreement, the Project Manager shall make the final decision as to percent completion of each activity.
10. After joint review, the County will process the Contractor's pay request based on progress from the schedule.
  - a. Payment to the Contractor shall be made from the progress reflected by the Interim or the Contract Schedule.
11. Time is of the essence: Whenever it becomes apparent from the current monthly progress review that phases of Work or the Contract Completion Date will not be met, through no fault of the County, the Contractor will take the following actions with no change in the contract amount:
  - a. Increase construction manpower to eliminate any adverse backlog of work.
  - b. Increase the number of working hours per shift, shifts per day, working days per week, the amount of construction equipment, or any combination of the foregoing to eliminate the adverse backlog of Work.
12. The Schedule as accepted by the County will be an integral part of the Contract, and will establish interim Contract Completion Dates or milestone dates for the various activities.
13. Delays of any non-critical Work shall not be the basis for an extension of Contract Time.
14. FLOAT TIME; Float is defined as the time that a non-critical Work activity can be delayed or extended without delaying the scheduled completion of milestones specified in this Section or the scheduled completion date of the Work, or both. Float time is not for the exclusive use or benefit of either County or Contractor. Neither Contractor nor County shall have an exclusive right to the use of float. Contractor is to document the effect on the updated Contract Schedule whenever float has been used. However, if float time associated with any chain of activities is expended but not exceeded by any actions attributable to the County, the Contractor will not be entitled to any extension of Contract time.
15. The contractor shall not sequester float through strategies; including extending activity duration estimates to consume available float, using preferential logic, using extensive or insufficient crew/resource loading, special lead/lag logic restraints or imposed dates. Use of float time disclosed or implied by the use of alternate float suppression techniques shall be shared to the benefit of both the County and Contractor.
16. Should any activity fall 14 calendar days or more behind the Contract Schedule accepted by the County, the County will have the right to order the Contractor to expedite completion of that activity using whatever means are appropriate and necessary, without additional compensation to the Contractor.
17. Should any activity fall 21 or more calendar days behind the Official Contract Schedule approved by the County, through no fault of the County, the County will have the right to perform the activity or have the activity performed by whatever method the County deems appropriate. All costs incurred by the County in connection with expediting such activity under this subsection shall be reimbursed promptly to the County by the Contractor.
18. It is expressly understood and agreed that the failure by the County to either order the Contractor to expedite an activity or to expedite the activity by other means, pursuant to the two preceding paragraphs, shall not be considered precedent setting with respect to any other activities which may fall behind the Official Contract Schedule approved by the County; nor will it relieve the Contractor from completion of the Work in accordance with the Official Contract Schedule and the Contract Completion Date.
19. County's acceptance of, or its review of, comments about any schedule or scheduling data shall not relieve the Contractor from its sole responsibility to plan for, perform, and complete the Work within the Contract Time. Acceptance of or review of comments about any schedule shall not transfer



responsibility for any schedule to County nor imply their agreement with (1) any assumption upon which such schedule is based, or (2) any matter underlying or contained in such schedule.

20. Failure of County to discover errors or omissions in schedules that it has reviewed, or to inform Contractor that Contractor, Subcontractors, or others are behind schedule, or to direct or enforce procedures for complying with the Contract Schedule shall not relieve Contractor from its sole responsibility to perform and complete the Work within the Contract Time and shall not be a cause for an adjustment of the Contract Time or the Contract Sum.

**B. Schedule Revisions**

1. General: Revisions to accepted Construction Schedule must be approved in writing by the County and Contractor.
2. Contractor: Submit requests for revision to schedule to the County together with a Time Impact Analysis (TIA) and a written rationale for revisions and description of logic for re-sequencing work and maintaining Specific Contractual Milestone Dates listed in Contract Documents.
3. Proposed revisions acceptable to County may then be incorporated into next update of Construction Schedule following the review and acceptance.
4. Acceptance: Acceptance of revised schedule by County does not relieve Contractor of meeting contractual milestone and completion dates.

**C. Time Impact Analysis (TIA):**

1. The Contractor shall submit a written time impact analysis (TIA) – hard copy and electronic -- to the Project Manager with each request for adjustment of contract time, or when the Contractor or Project Manager consider that an approved or anticipated change may impact the critical path or contract progress.
2. The TIA shall illustrate the impacts of each change or delay on the current schedule completion date or internal milestone, as appropriate. The analysis shall use the accepted schedule that has a data date closest to and prior to the event. If the Project Manager determines that the accepted schedule used does not appropriately represent the conditions prior to the event, the accepted schedule shall be updated to the day before the event being analyzed. The TIA shall include an impact schedule developed from incorporating the event into the accepted schedule by adding or deleting activities, or by changing durations or logic of existing activities. If the impact schedule shows that incorporating the event modifies the critical path and scheduled completion date of the Official Contract Schedule, the difference between scheduled completion dates of the two schedules shall be equal to the adjustment of contract time. The Project Manager may construct and utilize an appropriate project schedule or other recognized method to determine adjustments in contract time until the Contractor provides the TIA.
3. The Contractor shall submit a TIA in duplicate within seven calendar days of receiving a written request for a TIA from the County. The Contractor shall allow the County 14 calendar days after receipt to accept or reject the submitted TIA. All approved TIA schedule changes shall be shown on the next update schedule.
4. If a TIA submitted by the Contractor is rejected by the County, the Contractor shall meet with the County to discuss and resolve issues related to the TIA. If agreement is not reached, the Contractor will be allowed 20 calendar days from the meeting to give notice of potential claim, as noted in Section 00700-7.4.A of the General Conditions. The Contractor shall only show actual as-built work, not unapproved changes related to the TIA, in subsequent update schedules. If agreement is reached at a later date, approved TIA schedule changes shall be shown on the next updated schedule. The County will withhold remaining payment on the schedule contract item if a TIA is requested by the County and not submitted by the Contractor within 21 calendar days. The schedule item payment will resume on the next payment application after the requested TIA is submitted. No other contract payment will be retained regarding TIA submittals.

**1.7 RECOVERY SCHEDULE**

- A. General: Should updated Construction Schedule show Contractor to be 15 or more calendar days behind schedule at any time during construction, Contractor will prepare Recovery Schedule displayed on CPM schedule, at no additional costs to County. Prepare Recovery Schedule to show plan for returning to original schedule as expeditiously as possible, and in a manner that complies with paragraph 1.7 Update Schedules, requirements.
- B. Schedule Preparation: Within three calendar days after notice from the County, prepare and submit to the County a Recovery Schedule, incorporating best available information from Subcontractors and others which will permit return to Construction Schedule at earliest possible time. Prepare Recovery Schedule to same level of detail as Construction Schedule and for maximum duration of one month.
- C. Schedule Review: Within seven calendar days after notice from County, participate in conference with County to review and evaluate Recovery Schedule. Submit revisions necessitated by review for County's acceptance within four calendar days of conference. Use accepted Recovery Schedule for its planned duration as basis for return to Construction Schedule.
- D. Schedule Assessment: Seven days prior to expiration of Recovery Schedule, confer with the County to assess effectiveness of Recovery Schedule. As a result of this conference, the County will direct Contractor as follows:
  - 1. Behind Schedule: If the County determines Contractor is still behind schedule, the County will direct Contractor to prepare another Recovery Schedule for subsequent pay period.
  - 2. On Schedule: If County determines Contractor has successfully complied with provisions of Recovery Schedule, the County will direct Contractor to return to use of Construction Schedule.

**1.8 FINAL UPDATE SCHEDULE**

- A. The Contractor shall submit a final as-built schedule with actual start and finish dates for the activities, within 30 calendar days after completion of the contract work. The Contractor shall provide a written statement with this submittal signed by the Contractor's Project Manager and an officer of the company stating, "To my knowledge and belief, the enclosed final update schedule reflects the actual start and finish dates of the actual activities for the project contained herein." An officer of the company may delegate in writing the authority to sign the statement to a responsible manager.

**PART 2 PRODUCTS**

Not Used

**PART 3 EXECUTION**

Not Used

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes:
  - 1. Shop drawings.
  - 2. Product data.
  - 3. Samples
  - 4. Manufacturers' certificates.
  - 5. Deferred Agency Approvals.

**1.2 DESCRIPTION**

- A. Types of SUBMITTALS: Submittal procedures specified in this section include construction progress schedules, shop drawings, product data, samples, and manufacturer's installation instructions.
- B. Intent: Architect's review of shop drawings is intended to be a preview of what the Contractor intends to provide, and will function as an effort to foresee unacceptable materials or assemblies and to avoid the possibility of their rejection at the Project Site. Architect will review submittals only for conformance with the design concept of the Project and with the information given in the Contract Documents.
- C. The Architect's review of shop drawings will be general and shall not be construed:
  - 1. As permitting departure from the Contract requirements except as otherwise provided for under "substitution" provisions of Section 01 60 00;
  - 2. As relieving Contractor of responsibility for omissions or errors, including details, dimensions, materials, etc.;
  - 3. That review of a separate item indicates acceptance of an assembly in which the item functions. Architect will only review acceptance of an assembly in which the item functions. Architect will only review submittals required by Contract Documents for conformance with design concept of the Project and with the information given in the Contract Documents.

**1.3 GENERAL SUBMITTAL PROCEDURES**

- A. Submittals shall be classified as either electronic or physical. Procedures for each type of submittal, as described below, shall be followed.
- B. Transmit each submittal with "Submittal Transmittal" form supplied by County.
- C. Number each submittal sequentially with a decimal for resubmittals. Also include in the submittal number the specification section number as a suffix (ie. 2.01-07 81 16).
- D. Identify Project, Contractor, Subcontractor or supplier; pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate.
- E. Apply Contractor's stamp and signature or initial (electronically or physically) certifying that review, 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.

- F. Unless otherwise authorized by the Architect, all of the submittals required by a specification section shall be submitted together at the same time. Electronic submittals of product data, shop drawings, etc. may be submitted ahead of physical color samples with approval of the Engineer. Submittals that do not include all required submittals for a given specification section will be returned without review.
- G. Schedule submittals to expedite the Project, and deliver to Owner's Representative. Coordinate submission of related items.
- H. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
- I. Substitutions must be submitted according to Section 01 60 00. Substitutions submitted without following this procedure will be rejected.
- J. Provide space for Contractor and Architect review stamps.
- K. Revise and resubmit submittals as required, identify all changes made since previous submittal.
- L. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

#### 1.4 ELECTRONIC SUBMITTAL PROCEDURES

- A. Construction Progress Schedules, Product Data, Shop Drawings, and Manufacture's Installation Instructions shall be submitted electronically.
- B. Electronic submittals shall be emailed or uploaded to Owner's Representative in full size PDF format. Do not reduce Shop Drawings from original sheet size.
- C. PDF copy of electronic submittals will be returned to the Contractor. Contractor may distribute submittals to the concerned parties electronically or physically. Any printing costs for physical distribution of submittals shall be borne by the Contractor. The Architect will not print copies for distribution.
- D. Follow all General Submittal Procedures as described above.

#### 1.5 PHYSICAL SUBMITTAL PROCEDURES

- A. Samples, Color Charts, and Agency Deferred Approvals shall be physical submittals. Construction Progress Schedules, Product Data, Shop Drawings and Manufacturer's Installation Instructions may, with the County's approval, be physical submittals.
- B. The County will retain a minimum of three samples, submit the number that will be needed by contractor plus three.
- C. Follow all General Submittal Procedures as described above.

#### 1.6 CONTRACTOR RESPONSIBILITIES

- A. Review shop drawings, product data and samples prior to submission.
- B. Determine and verify:
  - 1. Field measurements.
  - 2. Field construction criteria.
  - 3. Catalog numbers and similar data.
  - 4. Conformance with specifications.

- 5. Conformance with applicable codes.
  - C. Submittals giving inadequate indication of contractor review and approval will be returned without review, for resubmission.
  - D. Coordinate each submittal with requirements of the Work and of the Contract Documents.
  - E. Notify the Architect in writing, at time of submission, of any deviations in the submittals from requirements of the Contract Documents.
  - F. Begin no fabrication or construction activity that requires submittals until return of submittals with Architect's stamp and initials or signature indicating finish review.
  - G. After Architect's final review, distribute copies.
- 1.7 SHOP DRAWINGS
- A. Submit electronically.
  - B. After review and distribution in accordance with Submittal Procedures, retain one copy of all reviewed shop drawings at the job and label them "PROJECT RECORD" as described in Section 01 77 00 Closeout Procedures.
- 1.8 PRODUCT DATA
- A. Submit electronically.
  - B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.
  - C. After review, distribute in accordance with Submittal Procedures and provide copies for Record Documents as described in Section 01 77 00.
  - D. Show dimensions and clearances required.
- 1.9 SAMPLES
- A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Provide units identical with final condition of proposed materials or products for the work. Coordinate sample submittals for interfacing work.
  - B. Submit samples of finishes from the full range of manufacturers' standard colors textures, and patterns for Architect's selection.
  - C. Include identification on each sample, with full Project information.
  - D. Submit the number or samples specified in individual specification Sections; three of which will be retained by Engineer.
  - E. Reviewed samples which may be used in the Work are indicated in individual specification Sections.
- 1.10 MANUFACTURER'S INSTRUCTIONS
- A. Submit manufacturers' instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, electronically.
  - B. Identify conflicts between manufacturers' instructions and Contract Documents.

**1.11 MANUFACTURER'S CERTIFICATES**

- A. When specified in individual specification Sections, submit manufacturers' certificate electronically.
- B. Contractor/Subcontractor Warranty form for the work of the particular spec section, completed except for signature. The Effective Date of warranty shall reference the date to be established as Final Acceptance.

**1.12 DEFERRED AGENCY APPROVALS**

- A. The General Contractor shall submit, or cause to be submitted by Subcontractors, within 60 days of contract signing, all required deferred approvals. The General Contractor or Subcontractors shall complete all deferred approval packages, including design and engineering calculations, in a manner acceptable to the agency requiring such submittal. The General Contractor shall within 15 days of contract signing, develop a schedule of critical dates of deferred approval acceptance by the reviewing agency. These critical dates shall be reflected in the required project schedule and all deferred approvals submitted within 45 days of schedule submittal.
- B. For all deferred items, it is the responsibility of the contractor to see that all submittals are stamped and signed by a California licensed design professional (an architect or PE is acceptable). The County and Architect will then review the submittal and if the design is acceptable provide a Statement of General Conformance that the submittal conforms to the design intent. Neither the Project's Architect or any of its consulting engineers will stamp and sign these deferred approval submittals other than with the standard shop drawing stamp. It is the responsibility of the manufacturing entity to procure necessary stamps and signatures from its own design professionals.
- C. All Deferred Approvals shall be submitted by the County to all required permitting agencies. If the Contractor fails to provide a required submittal, the Owner may elect to engage the design team or additional consultants to produce these and back charge the General Contractor for the cost and any schedule impact this may cause.

**1.13 ACTION ON SUBMITTALS**

- A. The County will review each submittal, mark with a "Review Code" and where possible, return within a reasonable period of time from date of receipt. Where submittal must be held for coordination, Contractor will be so advised without delay. Action markings shall be interpreted as follows:
  - 1. No Exceptions Noted
  - 2. Implement Exceptions Noted
  - 3. Revise and Resubmit
  - 4. Rejected
  - 5. Cancelled

**PART 2 PRODUCTS (NOT USED)**

**PART 2 - PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. This Section specifies administrative and procedural requirements for handling and processing the following contract modifications:
  - 1. Request for Information (RFI).
  - 2. Field Order (FO).
  - 3. Request for Cost Proposal (RFCP).
  - 4. Cost Proposal (CP).
  - 5. Change Orders (CO).

**1.2 DEFINITIONS**

- A. Request for Information (RFI)
  - 1. Written request submitted by Contractor to Owner's Representative via the County's online project management system on a form supplied by Owner's Representative requesting clarification, interpretation, or additional information pertaining to Contract Documents.
  - 2. An RFI shall not be used as a vehicle for only confirming or verifying issues.
- B. Field Order (FO)
  - 1. Owner's Representative written directives to the Contractor covering a specific aspect of work, signed by the Owner or Owner's lead agency that authorizes changes in the Work to expedite the change order process.
- C. Request for Cost Proposal (RFCP)
  - 1. Written request by the Owner's Representative to the Contractor to quote change to Contract Sum and/or Contract Time for proposed change to Contract Document.
- D. Cost Proposal (CP)
  - 1. Written request by the Contractor to the Owner's Representative to change Contract Sum and/or Contract Time for proposed change to Contract Document.
- E. Change Order (CO)
  - 1. Initiated by the Owner, Contractor, Consultant, Owner's lead agency, or the Owner's Representative and signed by the Owner and Contractor stating their agreement to a change to Contract Documents and adjustment to Sum and/or Contract Time.

**1.3 REQUEST FOR INFORMATION (RFI)**

- A. Submit RFIs numbered in sequential order, reviewed by the Contractor with respect to Contract Documents.
  - 1. Submit RFI's on forms designated by the Owner's Representative.
- B. Owner's Representative will monitor the RFI process and responses from the Consultant. The Consultant will receive RFI's only from the Owner's Representative; Consultant will not accept RFI's directly from any other entity.
- C. Owner's Representative will receive only legible, properly prepared RFI:
  - 1. Unreadable facsimile machine RFI's, illegibly written RFI's, or RFI's with incomplete information, will be returned promptly without action.
  - 2. RFI's may be transmitted to Owner's Representative by online project management system.

- a. Owner's Representative will forward to Consultant for review, and return response by same method received from Contractor.
3. Consultant will review RFI's with respect to Contract Documents and return response in a timely manner, generally within 7 calendar days, or commensurate with RFI subject.
  - a. RFI's marked "URGENT" will take precedence over outstanding RFI's and be answered by Consultant as soon as possible.
- D. Contractor being fully familiar with Contract Documents, shall not be relieved of responsibility to coordinate the Work to prevent adverse impact to Project schedule when submitting RFIs to Owner's Representative for clarification or interpretation of Contract Documents, or additional information.
- E. If the Contractor believes the scope of work referenced in the RFI has a cost and /or time impact, he will not proceed with the work until either a Field Order or a Change Order has been issued.

#### **1.4 FIELD ORDER (FO)**

- A. Field Orders may include supplementary or revised Drawings and/or Specification to describe changes to Contract Documents.
- B. Field Orders will be executed on forms designated by the Owner's Representative.
- C. Field Orders may be generated by the Contractor's written notice submitted on a Cost Proposal form, that an RFI response or other unforeseen condition has changed the Contract cost and /or time, and that schedule impact will result if written directive is not provided in a timely manner.
- D. Contractor shall provide an estimate of cost and/or time impact at the time of the request for a Field Order.
- E. Owner's Representative will review the request for a Field Order and initiate a written Field Order for authorization by the Owner or Owner's lead agency.
- F. If the Field Order is approved by the Owner or Owner's lead agency, Owner's Representative will release the signed Field Order to the Contractor. If rejected, the Contractor is so notified by the Owner's Representative.

#### **1.5 REQUEST FOR COST PROPOSAL (RFCP)**

- A. Request for Cost Proposal is an informational request only, and is not an instruction or authorization to execute a change, or an order to stop Work in progress.
- B. Request for Cost Proposal may include supplementary or revised Drawings and/or Specification to describe proposed changes to Contract Documents.
- C. Contractor shall submit cost and/or time quotation to Owner's Representative within 15 calendar days following receipt of Request for Cost Proposal.

#### **1.6 COST PROPOSAL (CP)**

- A. Contractor shall submit to the Owner's Representative a Cost Proposal for all occurrences the Contractor believes impacts Scope of Work cost and/or time.
  1. A Cost Proposal shall be submitted within 15 calendar days of the occurrences.



- B. Submit Cost Proposal numbered in sequential order, reviewed by the Contractor with respect to Contract Documents.
  - 1. Submit Cost Proposals on forms designated by the Owner's Representative.
- C. All Cost Proposals submitted shall have detailed breakdown for all associated work, cost and/or time.
- D. Owner's Representative will solicit and monitor independent cost estimates responses from the Consultant.
- E. Owner's Representative shall return Cost Proposal responses and reviews to the Contractor within 15 calendar days following receipt of Cost Proposal.
- F. A processed Cost Proposals is informational back-up for a potential Change Order, and not an instruction or authorization to execute a change, or an order to stop Work in progress.

**1.7 CHANGE ORDER (CO)**

- A. Change Orders may be initiated by the Owner, Contractor, Consultant, Owner's lead agency, or the Owner's Representative.
- B. Changes to the Project Contract Sum and/or Contract Time listed or indicated in Change Orders shall include or be determined by methods described in the General Conditions.
- C. Owner's Representative has responsibility for processing and administering Change Orders for the Project, and will prepare each Change Order using form designated by the Owner's Representative.
- D. Contractor shall provide all final Cost Proposals for a Change Order. The Consultant shall provide independent cost estimates to Cost Proposals.
  - 1. The Owner's Representative may request that the contractor revise each cost proposal if there is a differential between the Contractor's proposal and the Consultant's cost estimate.
  - 2. If no agreement is reached, the Owner's Representative may issue a time and material Field Order.
    - a. Use Daily Force Account Report designated by Owner's Representative.
- E. The Contractor, Consultant, Owner's Representative, Owner's lead agency and Owner will sign a fully documented Change Order.

**1.8 CORRELATING CHANGE ORDERS WITH OTHER CONTRACT REQUIREMENTS**

- A. Revise Schedule of Values and Applications for Payment to record each Change Order as a separate item of work with adjustment to Contract Sum and Contract Time.
- B. Revise Construction Schedule to reflect each change in Contract Time.
- C. Record modifications in Record Documents.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Qualifications.
- B. Quality Assurance
- C. Tolerances.
- D. Labeling.
- E. Seismic Considerations.
- F. Conflicting Requirements
- G. Field samples.
- H. Testing and inspection laboratory services.
- I. Manufacturers' field services and reports.

**1.2 QUALIFICATIONS**

- A. General: Qualifications paragraphs in this Subsection establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product, that are similar to those indicated for this Project in material, design, and extent.
- E. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

**1.3 QUALITY ASSURANCE**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions and workmanship, to produce Work of specified quality.
- B. Comply fully with manufacturers' instructions, including each step in sequence.

- C. When manufacturers' instructions conflict with the Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Work shall be performed by persons qualified to produce workmanship of specified quality.
- F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.
- H. Contractor's Line of Authority: Contractor shall provide one person who shall be both knowledgeable and responsible for all work to be performed on this project at all times during normal work hours. In Contractor's absence, Contractor's appointed representative shall be responsible for all directions given him and said directions shall be binding as if given to Contractor. Contractor's representative shall be responsible to coordinate all work to be performed.
- I. Shop and field work shall be performed by mechanics skilled and experienced in the fabrication and installation of the work involved. All work on this project shall be done in accordance with the best practices of the various trades involved and in accordance with Drawings, accepted shop drawings, and Specifications.
- J. All work shall be erected and installed plumb, level, square and true and in proper alignment and relationship to the work of other trades. All finished work shall be free from defects. Engineer and/or Architect reserve the right to reject any materials and workmanship that are not considered to be up to the highest standards of the various trades involved. Such inferior material or workmanship shall be replaced at no cost to County.
- K. All work shall be installed by knowledgeable installers and defined "Eligible" by the specified materials manufacturers. Specifications and recommendations of the manufacturer, whose materials are used, shall be strictly adhered to during application or installation of materials.
- L. Any additional work beyond that specified or illustrated, or any modification thereto, that is necessary for the furnishing of warranty shall be provided by Contractor at no cost to County.

#### **1.4 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. When manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

#### **1.5 LABELING**

- A. Attach label from agency approved by authority having jurisdiction for products, assemblies, and systems required to be labeled by CBC.

- B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label.
  - 1. Model number.
  - 2. Serial number.
  - 3. Performance characteristics.

### **1.6 SEISMIC CERTIFICATION OF NONSTRUCTURAL COMPONENTS**

- A. The manufacturer of each designated seismic system components subject to the provisions of ASCE 7 Section 13.2.2 shall test or analyze the component and its mounting system or anchorage and submit a certificate of compliance for review and acceptance by the registered design professional responsible for the design of the designated seismic system and for approval by the building official in accordance with 2019 CBC, Chapter 17 "Structural Tests and Special Inspections", Section 1708 "In Situ Load Tests".

### **1.7 CONFLICTING REQUIREMENTS**

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Engineer for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding.

### **1.8 FIELD SAMPLES**

- A. Install field samples at the site as required by individual specifications Sections for review.
- B. Acceptable samples represent a quality level for the Work.
- C. Where field sample is specified in individual Sections to be removed, clear area after field sample has been accepted by Architect.

### **1.9 INSPECTION AND TESTING LABORATORY SERVICES**

- A. County will select and pay for the services of an independent Inspection/Testing Laboratory to perform inspections and testing.
  - 1. Special Inspector: As required by 2019 CBC including Chapter 17 "Structural Tests and Special Inspections."
    - a. Special Inspection: As defined in CBC Chapter 17, Section 1704 "Special Inspections and Tests, Contractor Responsibility and Structural Observation."
- B. Inspection/Testing Laboratory will perform inspections, tests, and other services specified in individual specification Sections and as required by Engineer.
  - 1. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.
- C. Reports will be submitted by inspection/Testing Laboratory to Architect, Engineer, and Contractor, indicating observations and results of tests and indicating compliance or non-

compliance with the Contract Documents.

- D. Cooperate with Inspection/Testing Laboratory; furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.
  - 1. Notify Engineer, and Inspection/Testing Laboratory 24 hours prior to expected time for operations requiring services.
  - 2. Make arrangements with Inspection/Testing Laboratory and pay for additional samples and tests required for Contractor's use.
- E. The Inspection/Testing Laboratory shall perform inspection of work to determine conformance with these Standards.
  - 1. Request for inspection shall be made to the office of the Inspection/Testing Laboratory a minimum of 24 hours in advance of the time the inspection is desired.
  - 2. Underground work shall not be backfilled or covered until an inspection by the Inspection/Testing Laboratory has been completed and the work approved. Any work that is covered without inspection shall be uncovered at Contractor's expense, for completion of inspection work.
  - 3. The Inspection/Testing Laboratory shall have access to the Work at all times and shall be furnished every reasonable facility for ascertaining that the work done, materials used and workmanship performed are in accordance with the requirements of these Standards.
  - 4. Inspection of the Work shall not relieve Contractor of any of his obligations to satisfactorily perform the Work in accordance with requirements of Contract Documents.
- F. Retesting or reinspection required because of non-conformance to specified requirements shall be performed by the same Inspection/Testing Laboratory. Payment for retesting will be charged to Contractor by deducting inspection or testing charges from the Contract Sum.
- G. If the Work to be tested or inspected is not ready or sufficiently completed to allow the test/inspection service to complete required test(s)/inspection(s), costs and expenses of the test/inspection service to return to the Site or fabrication facility to perform/complete required test(s)/inspection(s) shall be charged to Contractor by deducting such costs and expenses from the Contract Sum.
- H. Contractor shall coordinate items to be tested to minimize the number of tests and trips to the site by the testing laboratory.
- I. All Samples, specimens and tests shall be prepared and accomplished by a properly qualified person or testing laboratory, selected by County, who shall furnish County, Architect, Engineer, and Contractor with test reports, including test results, and stating that they were prepared in accordance with the specified provisions. All tests as well as sampling and preparation of samples shall be in accordance with applicable ASTM and other specified standards.

#### **1.10 MANUFACTURERS' FIELD SERVICES AND REPORTS**

- A. When specified in individual specification Sections, material and product suppliers, and manufacturers shall provide qualified personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, testing, adjusting, and balancing of equipment, as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of qualified personnel to Engineer at least thirty days in advance of required observations.
- C. Qualified personnel shall report observations, site decisions, and supplemental instructions

given to applicators and installers, and description of work installed contrary to manufacturers' written instructions, as applicable.

- D. Submit report in duplicate within thirty days of observation to Engineer for review.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

**3.1 EXAMINATION**

- A. Verify and ensure that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify and ensure that existing substrate is capable of structural support and attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual specification Sections.
- D. Verify utility services are available, of correct characteristics, and in correct locations.

**3.2 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 new material or substance in contact or bond.

**END OF SECTION**

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

- A. Reference Standards.
- B. Definitions.
- C. Abbreviations and Acronyms.

### 1.2 REFERENCES

- A. General: References are made throughout the Specifications to various codes, reference standards, practices and requirements for materials, work quality, installation, inspections and tests which are published and issued by government agencies, professional and trade organizations, societies, associations and testing agencies. References to these publications are made by acronyms or abbreviations as listed in this Section.
- B. Obtain copies of reference standards, manuals and codes directly from publication sources as needed for proper performance and completion of the Work.
- C. Standards, manuals and codes referenced in the Specifications form part of these Specifications to the extent referenced. No provisions of any such standard, specification, manual, or code or instruction shall be effective to change the duties and responsibilities of County, Architect, or Contractor; any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents; nor shall it be effective to assign to County, Architect or any of Architect's consultants, agents, or employees, a duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.
- D. Reference to standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual unless noted otherwise.

### 1.3 DEFINITIONS

- A. General: Words and abbreviations used in the Specifications are given meaning as defined in "The American Heritage Dictionary of the English Language" and as commonly used and accepted in the construction industry. Abbreviations and symbols used on Drawings are identified on Drawings.
- B. Words and Terms: The following words and terms used in the Specifications shall mean as indicated.
  - 1. Accepted Comparable: Reviewed and accepted by the County as being comparable in quality, utility, and appearance.
  - 2. Approved: As accepted by the County.
  - 3. Words and terms "or Architect Approved Substitute" and "or Comparable" used in the Specifications shall have the same meaning as "Accepted Comparable".
  - 4. Contractor Shall: To be concise; sentences, statements, and clauses used in the Specifications exclude any form of the verb "shall", which is normally expressed in a verb phrase with verbs such as "furnish", "install", "provide", "perform", "construct", "erect", "comply", "apply", "submit", etc. Any such sentences, statements, and clauses are to be interpreted to include applicable form of phrase "Contractor shall".
  - 5. Furnish: Supply and deliver to Project site, ready for installation; unload and inspect for damage.

6. Install: Anchor, fasten, or connect in place and adjust for use; place or apply in proper position and location; establish in place for use or service including all necessary labor, tools, equipment, and implements necessary to perform work indicated, ready for operation or use.
7. Observe: Used in reference to Architect means to become familiar with the process and quality of the Work and to determine if the Work is proceeding in general accordance with the Contract Documents based on what is plainly visible at the construction site, without removal of its materials or other construction that is in place.
8. Products: New material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work.
9. Provide: Furnish and install all items necessary to complete work, ready for operation or use.

#### **1.4 CODES, REGULATIONS, GOVERNING AGENCIES**

- A. California Code of Regulations.
  1. Title 8, Division 1, Chapter 3.2 – California Occupational Safety and Health Regulations (Cal/OSHA).
  2. Title 8, Division 1, Chapter 4, Subchapter 4 – Construction Safety Orders.
  3. Title 8, Division 1, Chapter 4, Subchapter 6 – Elevator Safety Orders
  4. Title 19, Division 1 – Regulations of the State Fire Marshal (SFM).
  5. Title 24 – California Building Standards Code (CBSC).
    - a. Part 1 – California Administrative Code (CAC).
    - b. Part 2 – California Building Code (CBC).
    - c. Part 3 – California Electrical Code (CEC).
    - d. Part 4 – California Mechanical Code (CMC).
    - e. Part 5 – California Plumbing Code (CPC).
    - f. Part 6 – California Energy Code (CEC).
    - g. Part 7 – California Elevator Safety Construction Code.
    - h. Part 8 – California Historical Building Code.
    - i. Part 9 – California Fire Code (CFC).
    - j. Part 10 – California Existing Building Code.
    - k. Part 11 – California Green Building Standards Code.
    - l. Part 12 – California Referenced Standards Code.
- B. California Department of Transportation (Caltrans).
- C. California Department of General Services (DGS).
- D. California Environmental Protection Agency (Cal/EPA).
  1. California Air Resources Board (CARB).
  2. California State Water Resources Control Board (SWRCB).
  3. Department of Pesticide Regulation (DPR).
- E. Code of Federal Regulations (CFR) Title 28, Part 36 – ADA Standards for Accessible Design, Appendix A – ADA Accessibility Guidelines (ADAAG) for Buildings and Facilities.
- F. Occupational Safety and Health Act (OSHA).
- G. U.S. Environmental Protection Agency (EPA).
- H. U.S. Department of Energy (DOE).

#### **1.5 REFERENCES, ABBREVIATIONS, AND ACRONYMS**



AA	Aluminum Association.
AAADM	American Association of Automatic Door Manufacturers.
AABC	Associated Air Balance Council.
AAC	Aluminum Anodizer's Council.
AAMA	American Architectural Manufacturers Association.
AASHTO	American Association of State Highway and Transportation Officials.
AATCC	American Association of Textile Chemists and Colorists.
ABMA	American Boiler Manufacturer's Association.
ACGIH	American Conference of Government Industrial Hygienists, Inc.
ACI	American Concrete Institute.
ACPA	American Concrete Pipe Association.
AF&PA	American Forest and Paper Association (formerly National Forest Products Association).
AFBMA	Anti-Friction Bearing Manufacturer's Association.
AGA	American Gas Association.
AGC	Associated General Contractors of America.
AGMA	American Gear Manufacturers Association
AHA	American Hardboard Association.
AHJ	Authority Having Jurisdiction.
AI	Asphalt Institute.
AIA	American Institute of Architects.
AIEE	American Institute of Electrical Engineers.
AIHA	American Industrial Hygiene Association.
AISC	American Institute of Steel Construction.
AISI	American Iron and Steel Institute.
AITC	American Institute of Timber Construction.
ALSC	American Lumber Standards Committee.
AMCA	Air Movement and Control Association.
ANSI	American National Standards Institute, Inc.
APA	The Engineered Wood Association.
API	American Petroleum Institute.
APWA	American Public Works Association.
AQMD	Air Quality Management District.
ARI	Air-Conditioning and Refrigeration Institute.
ARMA	Asphalt Roofing Manufacturers Association.
ASCE	American Society of Civil Engineers.
ASD	Advanced Simulation and Design.
ASHRAE	American Society of Heating Refrigerating and Air Conditioning Engineers.
ASME	American Society of Mechanical Engineers.
ASPA	American Sod Producers Association.
ASSE	American Society of Sanitary Engineers.
ASTM	American Society for Testing and Materials.
ATF	Academy of Textiles and Flooring.
AWC	American Wood Council.
AWCI	Association of Wall and Ceiling Industries.
AWG	American Wire Gage.
AWI	Architectural Woodwork Institute.

AWPA	American Wood Protection Association.
AWS	American Welding Society.
AWWA	American Water Works Association.
BAAQMD	Bay Area Air Quality Management District
BHMA	Builders Hardware Manufacturers Association.
BIA	Brick Industry Association.
BOCA	Building Officials and Code Administrators International, Inc.
CAN/ULC	Underwriters' Laboratory of Canada.
CAS	Chemical Abstracts Service (division of the American Chemical Society).
CBC	California Building Code
CBM	Certified Ballast Manufacturers.
CCR	California Code of Regulations
CDA	Copper Development Association.
CE	US Army Corps of Engineers
CFFA	Chemical Fabrics and Film Association, Inc.
CFR	Code of Federal Regulations
CISCA	Ceiling and Interior Systems Construction Association.
CISPI	Cast Iron Soil Pipe Institute.
CLFMI	Chain Link Fence Manufacturing Institute.
CMU	Concrete Masonry Unit
CPA	Composite Panel Association.
CRA	California Redwood Association.
CRI	Carpet and Rug Institute.
CRSI	Concrete Reinforcing Steel Institute.
CS	Commercial Standard.
CSA	Corrections Standards Authority
CSI	Construction Specifications Institute.
CSIAC	California State Industrial Accident Commission.
DHI	Door Hardware Institute.
EIA	Electronic Industries Association.
EIMA	EIFS Industry Manufacturers Association.
ETL	Electrical Testing Laboratories.
EWS	Engineered Wood Systems
FEMA	Federal Emergency Management Agency.
FM	Factory Mutual Research and Engineering Corporation.
FMRC	Factory Mutual Research Corporation.
FS	Federal Specification – U.S. General Services Administration.
FSC	Forest Stewardship Council.
GA	Gypsum Association.
GANA	Glass Association of North America.
GMA	Flat Glass Marketing Association.
HPVA	Hardwood Plywood and Veneer Association.
IAPMO	International Association of Plumbing and Mechanical Officials.
ICC	International Code Council, Inc.
ICC	Interstate Commerce Commission.
ICC-ES	ICC Evaluation Service, Inc.

ICEA	Insulated Cable Engineers Association.
ICRI	International Concrete Repair Institute
IEEE	Institute of Electrical and Electronics Engineers.
IESNA	Illuminating Engineering Society of North America
IMIAC	International Masonry Industry All-Weather Council.
IPCEA	Insulated Power Cable Engineers Association.
ISO	International Standards Organization.
ITS	Intertek Testing Services.
LEED™	Leadership in Energy and Environmental Design (USGBC standard).
LRFD	Load and Resistance Factor Design.
LSGA	Laminators Safety Glass Association.
MBMA	Metal Building Manufacturers Association.
MFMA	Maple Flooring Manufacturers Association.
MFMA	Metal Framing Manufacturers Association.
MIA	Marble Institute of America
MIL	Military Specifications (U.S. Department of Defense).
ML/SFA	Metal Lath/Steel Framing Association Division of NAAMM.
MPI	Master Painters Institute.
MS4	Municipal Separate Storm Sewer Systems.
MSDS	Material Safety and Data Sheet.
MSJC	Masonry Standards Joint Committee.
MSMA	Metal Stud Manufacturers Association.
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry.
MUTCD	Manual of Uniform Traffic Control Devices (U.S. Department of Transportation).
NAAMM	National Association of Architectural Metal Manufacturers.
NAFS	North American Fenestration Standard (Co-published by AAMA & WDMA).
NAPHCC	National Association of Plumbing Heating Cooling Contractors.
NBBPVI	National Board of Boiler and Pressure Vessel Inspectors.
NBFU	National Board of Fire Underwriters.
NBGQA	National Building Granite Quarries Association, Inc.
NCMA	National Concrete Masonry Association.
NCPWB	National Certified Pipe Welding Bureau.
NCRP	National Council on Radiation Protection and Measurement.
NEBB	National Environmental Balancing Bureau.
NEC	National Electrical Code.
NEHRP	National Earthquake Hazards Reduction Program.
NEMA	National Electrical Manufacturers Association.
NES	National Evaluation Service, Inc.
NFPA	National Fire Protection Association.
NFRC	National Fenestration Rating Council.
NIBS	National Institute of Building Sciences.
NIST	National Institute of Science and Technology.
NOFMA	National Oak Flooring Manufacturers Association.
NPDES	National Pollutant Discharge Elimination System.
NRCA	National Roofing Contractors Association.
NRMCA	National Ready Mixed Concrete Association.

NSF	National Sanitation Foundation.
NTMA	National Terrazzo and Mosaic Association.
NWWDA	National Wood Window and Door Association.
OSHA	Occupational Safety and Health Act of 1970.
PCA	Portland Cement Association.
PCI	Precast Prestressed Concrete Institute.
PDI	Plumbing and Drainage Institute.
PEI	Porcelain Enamel Institute.
PS	Voluntary Product Standard (US Department of Commerce / NIST).
RCSC	Research Council on Structural Connections.
RIS	Redwood Inspection Service.
RMA	Rubber Manufacturers Association.
SC	Shading Coefficient.
SCAQMD	South Coast Air Quality Management District
SDI	Steel Deck Institute.
SDI	Steel Door Institute.
SF	Square Feet
SFBC	South Florida Building Code.
SHGC	Solar Heat Gain Coefficient.
SIGMA	Sealed Insulating Glass Manufacturers Association.
SMACNA	Sheet Metal and Air Conditioning Contractors National Association.
SPRI	Single-Ply Roofing Institute.
SSMA	Steel Stud Manufacturers Association.
SSPC	The Society for Protective Coatings.
SWI	Steel Window Institute.
SWPPP	Storm Water Pollution Prevention Plan.
SWRI	Sealant, Waterproofing, and Restoration Institute.
TCA	Tile Council of America.
TEMA	Tubular Exchanger Manufacturers Association, Inc.
TMS	The Masonry Society.
TPI	Truss Plate Institute.
TRI	Tile Roofing Institute.
UL	Underwriters Laboratories, Inc.
ULC	Underwriters Laboratories of Canada.
USGBC	US Green Building Council.
VOC	Volatile Organic Compounds.
WCLIB	West Coast Lumber Inspection Bureau.
WDMA	Window and Door Manufacturers Association (formerly NWWDA - National Wood Window and Door Association).
WDMA	Window and Door Manufacturers Association.
WH	Warnock Hersey.
WI	Woodwork Institute (formerly WIC – Woodwork Institute of California).
WSRCA	Western States Roofing Contractors Association.
WSFI	Wood and Synthetic Flooring Institute.
WWPA	Western Wood Products Association.

**NICHOLS, MELBURG & ROSSETTO  
ARCHITECTS**

**SECTION 01 42 00  
REFERENCES**

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities, including but not limited to:
  - 1. Water service and distribution.
  - 2. Sanitary facilities, including toilets, wash facilities, and drinking water facilities.
  - 3. Heating and cooling facilities.
  - 4. Ventilation.
  - 5. Electric power service.
  - 6. Lighting.
  - 7. Telephone service (Land line)
  - 8. Waste disposal facilities.
  - 9. Field office.
  - 10. Storage and fabrication sheds.
  - 11. Lifts and hoists.
  - 12. Construction aids and miscellaneous services and facilities.
  - 13. Environmental protection.
  - 14. Pest control.
  - 15. Enclosure fence.
  - 16. Security enclosure and lockup.
  - 17. Barricades, warning signs, and lights.
  - 18. Temporary partitions.
  - 19. Fire protection.
  - 20. Accessories necessary for a complete installation.
  - 21. Traffic barricades
  - 22. Encroachment Permits
- B. Construction Facilities: Temporary buildings, vehicular access, parking, project identification, progress cleaning, and fire prevention facilities.
- C. Protection of Work.
- D. Removal of utilities, facilities, and controls.
- E. Use Charges:
  - 1. Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and Authorities Having Jurisdiction.
  - 2. Water and Sewer Service: Pay sewer service use charges for water used and sewer usage by all entities for construction operations.
  - 3. Electric Power Service: Pay electric power service use charges for electricity used by all entities for construction operations.

**1.2 SUBMITTALS**

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Moisture Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
  2. Indicate procedures for discarding water damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged work.
  3. Indicate sequencing of work that requires water, such as sprayed fire resistive materials, plastering, and tile grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- C. Dust and HVAC Control Plan: Submit coordination drawing and narrative that indicates the dust and HVAC control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
1. HVAC system isolation schematic drawing.
  2. Location of proposed air-filtration system discharge.
  3. Waste handling procedures.
  4. Other dust control measures.

### **1.3 QUALITY ASSURANCE**

- A. Regulatory Requirements:
1. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board ADA-ABA Accessibility Guidelines (ADAAG), ICC/ANSI A117.1, and CBC 2019 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA).
- B. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- C. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

### **1.4 TEMPORARY UTILITIES**

- A. Temporary Electricity
1. Exercise measures to conserve energy.
  2. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required for portable construction tools and equipment.
  3. Install and maintain temporary distributions of electrical power to locations at the Site as necessary or appropriate for efficient prosecution of the Work. Remove temporary distributions as appropriate or as directed by County.
  4. Provide main service disconnect and overcurrent protection at convenient location.
- B. Temporary Lighting
1. Provide and maintain lighting for construction operations to achieve minimum lighting level of two (2) Lumens per square foot.
  2. Provide and maintain a minimum of one Lumen per square foot of lighting at exterior staging and storage areas after dark for security purposes.
  3. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtailed, and lamps for specified lighting levels.
  4. Maintain lighting and provide routine repairs.
- C. Temporary Ventilation
1. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to

prevent accumulation of dust, fumes, vapors, or gases.

- D. Temporary Water Service
  - 1. Contractor shall provide and pay for suitable quality water service as needed to maintain specified conditions for construction operations. Connect to nearest water source. Exercise measures to conserve water.
  - 2. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.
- E. Temporary Sanitary Service/Facilities
  - 1. Provide and maintain required temporary facilities for use by construction personnel. Maintain daily in sanitary and clean condition.

### **1.5 VEHICULAR ACCESS**

- A. Construct temporary all-weather access roads from public thoroughfares to serve construction area, of width and load bearing capacity to accommodate unimpeded traffic for construction purposes.
- B. Extend and relocate vehicular access as Work progress requires, provide detours as necessary for unimpeded traffic flow.
- C. Provide unimpeded access for emergency vehicles. Maintain 20 foot wide driveways with turning space between and around combustible materials.
- D. Provide and maintain access to fire hydrants and control valves free of obstructions.

### **1.6 PARKING**

- A. Coordinate parking areas to accommodate construction personnel with County.
- B. Provide temporary surface parking areas to accommodate construction personnel.
- C. When site space is not adequate, provide additional off-site parking.
- D. Use of designated existing on-site streets and driveways used for construction traffic is not permitted. Tracked vehicles not allowed on paved areas.
- E. Use of existing parking facilities used by construction personnel is not permitted.
- F. Do not allow heavy vehicles or construction equipment in parking areas.
- G. Permanent Pavements And Parking Facilities:
  - 1. Bases for permanent roads and parking areas may be used for construction traffic.
  - 2. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.
- H. Maintenance:
  - 1. Maintain traffic and parking areas in sound condition.
  - 2. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.
- I. Removal, Repair:
  - 1. Remove temporary materials and construction before Project Completion.
  - 2. Repair existing facilities damaged by use, to original condition.



**1.7 PROGRESS CLEANING AND WASTE REMOVAL**

- A. Maintain areas free of waste materials, debris and rubbish. Maintain site in a clean and orderly condition.
- 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. Remove waste materials, debris and rubbish from site daily and dispose off-site.

**1.8 FIRE PREVENTION FACILITIES**

- A. Smoking on the job site is prohibited.
- B. Establish fire watch for cutting and welding and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.
- C. Portable Fire Extinguishers: NFPA 10; 10 pound capacity, 4A-60B: C UL rating.
  - 1. Provide one fire extinguisher at each stair on each floor of buildings under construction.
  - 2. Provide minimum one fire extinguisher in every construction trailer and storage shed.
  - 3. Provide minimum one fire extinguisher on roof during roofing operations using heat producing equipment.

**1.9 BARRIERS AND ENCLOSURES**

- A. Provide 6 foot high temporary chain link fence barriers to prevent unauthorized entry to construction areas, and to protect adjacent properties from damage from construction operations and demolition.
- B. Provide protection for plants designated to remain. Replace damaged plants.
- C. Exterior Enclosures: Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

**1.10 SECURITY**

- A. Provide security and facilities to protect Work and County occupied areas affected by the Work from unauthorized entry, vandalism or theft.
- B. Initiate program at project mobilization. Maintain program throughout construction period until County occupancy.

**1.11 WATER CONTROL**

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site

from soil erosion.

**1.12 DUST CONTROL**

- A. Execute Work by methods to minimize raising dust from construction operations.
- B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

**1.13 EROSION AND SEDIMENT CONTROL**

- A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize surface area of bare soil exposed at one time.
- C. Provide temporary measures including berms, dikes, and drains, and other devices to prevent water flow.
- D. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

**1.14 NOISE CONTROL**

- A. Provide methods, means, and facilities to minimize noise produced by construction operations.

**1.15 POLLUTION CONTROL**

- A. 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.
- B. Comply with pollution and environmental control requirements of authorities having jurisdiction.

**1.16 PROTECTION OF INSTALLED WORK**

- A. Protect installed Work and provide special protection where specified in individual specification Sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.
- C. Provide protective coverings at walls, projections, jambs, sills and soffits of openings.
- D. Protect finished floors, stairs and other surfaces from traffic, dirt, wear, damage or movement of heavy objects, by protecting with durable sheet materials.

**1.17 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary above-grade or buried utilities, equipment, facilities, and materials prior to Project Completion.

- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

**3.1 PROJECT CONDITIONS**

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

**3.2 INSTALLATION**

- A. Locate facilities where they will serve project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

**3.3 TEMPORARY UTILITY INSTALLATION**

- A. Install temporary service. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
  - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
  - 1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
  - 2. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel who handle materials that require wash up. Dispose of drainage properly. Supply cleaning compounds appropriate for each type of material handled. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.
- E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
  - 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
  
- G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
  - 1. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.
    - a. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length voltage ratio.
    - b. Provide warning signs at power outlets other than 110 to 120 V.
    - c. Provide 4 gang outlets, spaced so 100 foot (30 m) extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.
  
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
  - 2. Install lighting for Project identification sign.
  
- I. Telephone Service: Provide temporary telephone service in common use facilities for use by construction personnel, Architect and inspection services.

### 3.4 SUPPORT FACILITIES INSTALLATION

- A. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
  - 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
  - 2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 31 20 00 Earthmoving.
  - 3. Recondition base after temporary use, including removing contaminated material, regrading, proof-rolling, compacting, and testing.
  - 4. Delay installation of final course of permanent pavement until immediately before Substantial Completion.
  
- B. Traffic Controls:
  - 1. Comply with requirements of authorities having jurisdiction:
    - a. Protect existing site improvements to remain including curbs, pavement, and utilities.
    - b. Maintain access for fire-fighting equipment and access to fire hydrants.
  
- C. Encroachment Permit:
  - 1. Contractor is responsible for all encroachment permits required for construction in Harrison Avenue.
  
- D. Parking: Provide temporary parking areas for construction personnel.

- E. Project Signs:
  - 1. Provide Project signs as indicated. Unauthorized signs are not permitted:
    - a. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
      - 1) Provide temporary, directional signs for construction personnel and visitors.
    - b. Maintain and touchup signs so they are legible at all times.
- F. Waste Disposal Facilities: Provide waste collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.
- G. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
  - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- H. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

### 3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities to the satisfaction of Owner and Architect.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
  - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree or plant protection zones.
  - 2. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
  - 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of Authorities Having Jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Site Enclosure Fence: Before construction operations begin provide site enclosure fence to prevent people and animals from easily entering site except by entrance gates.
  - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
- F. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each Work day.

- G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- H. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
  - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- J. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program:
  - 1. Prohibit smoking in construction areas.
  - 2. Supervise welding operations, combustion type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
  - 3. Develop and supervise an overall fire prevention and protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
  - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

### 3.6 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture Protection Plan: Avoid trapping water in finished Work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
  - 1. Protect porous materials from water damage.
  - 2. Protect stored and installed material from flowing or standing water.
  - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
  - 4. Remove standing water from decks.
  - 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
  - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
  - 2. Keep interior spaces reasonably clean and protected from water damage.
  - 3. Periodically collect and remove waste containing cellulose or other organic matter.
  - 4. Discard or replace water-damaged material.
  - 5. Do not install material that is wet.
  - 6. Discard, replace, or clean stored or installed material that begins to grow mold.
  - 7. Perform Work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Condition Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
  - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.

2. Use permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits and moisture control.
  - a. Hygroscopic materials that may support mold growth, including wood and gypsum based products, which become wet during the course of construction and remain wet for 48 hours are considered defective and are to be removed and replaced.
  - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
  - c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

### **3.7 OPERATION, TERMINATION, AND REMOVAL**

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance:
  1. Maintain facilities in good operating condition until removal:
    - a. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24 hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion unless otherwise required and approved by Owner and Architect.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
  2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
  3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 22.

**END OF SECTION**

## PART 1 GENERAL

### 1.1 SUMMARY

- A. Section includes: Administrative and procedural requirements for selection of products, including but not limited to:
  - 1. Products.
  - 2. Product Delivery Requirements.
  - 3. Product Storage and Handling Requirements.
  - 4. Product Options.
  - 5. Product Selection Procedures.
  - 6. Product Substitution Procedures.
  - 7. Comparable Products.

### 1.2 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term *product* includes the terms *material*, *equipment*, *system*, *assembly*, and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature current as of date of the Contract Documents.
  - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
  - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis of Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words *basis of design product*, including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

### 1.3 SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Include data to indicate compliance with the specified requirements.
  - 2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
    - a. Form of Approval: As specified in Section 01 33 00 Submittal Procedures.
    - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis of Design Product Specification Submittal: Comply with requirements in Section 01 33 00 Submittal Procedures. Show compliance with requirements.



**1.4 QUALITY ASSURANCE**

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
  - 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
  - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
  - 1. Schedule delivery to minimize long term storage at site and to prevent overcrowding of construction spaces.
  - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
  - 1. Store products to allow for inspection and measurement of quantity or counting of units.
  - 2. Store materials in a manner that will not endanger Project structure.
  - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
  - 4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
  - 5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
  - 6. Protect stored products from damage and liquids from freezing.
  - 7. Provide a secure location and enclosure at site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

**1.6 PRODUCT WARRANTIES**

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
  - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  - 2. Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
  2. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 77 00 Closeout Procedures.

### **1.7 PRODUCTS**

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.
- B. All products shall be new, of first class quality, and shall be delivered, installed, connected and finished in every detail, and shall be so selected and arranged as to fit correctly into the proper spaces. Where no specific kind or quality of material is given, a first-class standard article as approved by Architect shall be furnished. Contractor shall provide satisfactory evidence as to the kinds and quality of material and workmanship.
- C. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- D. Furnish interchangeable components from same manufacturer for components being replaced.

### **1.8 PRODUCT DELIVERY REQUIREMENTS**

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Delivery of materials to the Project site shall be coordinated by and received by Contractor or his representative, and stored in secured areas as agreed upon at the job start meeting.
- C. Promptly inspect shipments to assure that products comply with requirements, quantities are correct and products are undamaged.
- D. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement or damage.
- E. Contractor shall take into consideration the available space and location of work site when delivery of materials is necessary.

### **1.9 PRODUCT STORAGE AND HANDLING REQUIREMENTS**

- A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- B. For exterior storage of fabricated products, place on sloped supports above ground.
- C. Provide off-site storage and protection when site does not permit on-site storage or protection.
- D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation and degradation of products.

- E. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
- F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- G. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.
- H. Contractor shall be responsible to provide all new materials in unopened manufacturer's original containers and deliver such items to Project site in good condition for use on this project. Contractor shall be responsible to store all new materials received as per manufacturer recommendations. Any and all materials discovered to be improperly stored and/or damaged will be replaced at the sole expense to Contractor. Any requests for delays or extension of the Contract Time due to the above will not be considered.
- I. Contractor shall use all means necessary to protect all materials before, during and after installation and to protect the installed work and materials of all other trades and of existing structures. In event of damage, Contractor is to immediately make all repairs and replacements necessary using compatible and like materials.

**1.10 PRODUCT OPTIONS**

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One Manufacturer and stating "No Substitutions Allowed, County's Standard": Products of manufacturer named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers without naming a Product, with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.
- D. Products specified by Naming One or More Manufacturers and Naming Product(s) by the first listed Manufacturer, with a Provision for Substitutions: Submit a request for substitution for any product, by any manufacturer, listed or not listed, other than the product(s) listed.

**1.11 PRODUCT SUBSTITUTION PROCEDURES**

- A. County will consider requests for Substitutions up to 35 days after the project has been awarded.
- B. Reference to any product, material, equipment, article, system, service or patented process, by trade, catalogue number, name brand product or product manufacturer is for information only and shall not be construed as limiting competition.
- C. Substitutions will only be considered when one or more of the following conditions are met:
  - 1. All aspects of the proposed substitution meet or exceed the criteria for the specified product.
  - 2. The proposed changes are in keeping with the general intent of the Contract Documents.
  - 3. The request is fully documented and timely and properly submitted.
  - 4. The specified product cannot be provided within the Contract Time.
  - 5. The request is directly related to a "comparable" clause or similar language in the

Contract Documents.

6. The request offers County a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities that County must assume. County's additional responsibilities may include, but not be limited to, compensation to Architect for redesign and/or evaluation services and increased cost of other construction by County.
  7. The specified product becomes unavailable through no fault of Contractor.
  8. The specified product cannot receive necessary approvals by governing authorities, and the requested substitution can be approved by governing authorities in a timely manner.
  9. It can be demonstrated that the specified product cannot be provided in a manner that is compatible with other materials and Contractor certifies that the proposed substitution will overcome the incompatibility.
  10. It can be demonstrated that the specified product cannot be coordinated with other materials and Contractor certifies that the proposed substitution can be coordinated.
  11. The specified product cannot provide the warranty required by the Contract Documents and Contractor certifies that the proposed substitution provides the required warranty.
- D. Substitutions will not be considered when one or more of the following conditions occur:
1. Acceptance would require revisions to the Contract Documents, Contract Time extensions or an increase in the Contract Sum.
  2. They are indicated or implied on shop drawing or product data submittals, without separate written request.
  3. When the specified product cannot be provided as a result of failure of Contractor to pursue the Work in a timely manner or properly coordinate construction activities.
- E. In those cases where the Specifications designate a product, material, equipment, article, system, service or patented process by specific brand or trade name and there is only one brand or trade name listed, the item involved is:
1. Required to be used since it is a unique or novel product application, or
  2. Required to match other products in use by County, or
  3. Is the only brand or trade name known to Architect.
- F. Document each request on Substitution Request Form attached at the end of this Section with complete data substantiating compliance of proposed Substitution with the Contract Documents. The burden of proof as to comparative quality, suitability and performance of proposed product(s), material(s), equipment, article(s), system(s), service(s) or patented process(es) shall be upon Contractor. Architect will be the sole judge of the equality of the proposed substitution versus the specified item(s).
- G. A substitution request constitutes a representation that Contractor:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  2. Will provide the same warranty for the Substitution as for the specified product.
  3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to County.
  4. Waives claims for additional costs or time extensions which may subsequently become apparent.
  5. Will reimburse County for review services associated with approvals by authorities having jurisdiction.
- H. Substitution Submittal Procedure:
1. Submit request for Substitution electronically for consideration. Limit each request to one proposed Substitution.
  2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
  3. County will notify Contractor, in writing, of decision to accept or reject request.

4. Incomplete Substitution Request package will not be reviewed and will be returned to Contractor. Contractor shall then provide the specified item.
5. Only one request for substitution will be allowed. If proposed substitution is not accepted by Architect, Contractor shall provide the specified item.
6. Use of accepted substitutions shall in no way relieve Contractor from responsibility for compliance with Drawings and Specifications. The use of accepted substitutions will assume that all extra costs caused by the use of such substitutions where they affect other work or trades shall be borne by the Contractor.
7. All substitutions affecting structural or fire/life safety items will require approval from authority having jurisdiction prior to fabrication and installation on the project.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- A. Materials furnished shall be new and never been used before, unless specified otherwise, and will satisfy the requirements herein and all specifications referenced by provisions within these specifications. Contractor shall furnish, upon request of Project Manager, an affidavit from the manufacturer or supplier to the effect that materials furnished shall conform to the General Conditions, the latest revision of AWWA Specifications, ASTM, and Federal Specifications that pertain. All materials shall be installed in accordance with manufacturer's recommendations and the Standard Drawings and Specifications that pertain. Material for one specific product shall be one manufacturer unless otherwise approved by Architect. All materials shall be subject to inspection after delivery to the site and during installation of the Work. Failure of the Inspector, Project Manager or Architect to note faulty material shall not relieve Contractor of the responsibility for removing or replacing any such material at no additional cost to County.
- B. For the ease of maintenance and parts replacement, to the maximum extent possible use materials of a single manufacturer, delivered in manufacturer's original, unopened containers with labels intact and legible, and in sufficient quantity to allow continuity of work. Deviation from this requirement shall require written approval from County.
- C. County reserves the right to reject any materials list which contains materials from various manufacturers if suitable materials can be secured from fewer manufacturers and to require that source of materials be unified to maximum extent possible.

### **2.2 PRODUCT SELECTION PROCEDURES**

- A. Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
  1. Provide products complete with accessories, trim, finish, fasteners, and items needed for complete installation and indicated use and effect.
  2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  4. Where products are accompanied by the term as selected, Architect will make selection.
  5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B. Product Selection Procedures:
  1. Product: Where Specifications name a single manufacturer and product, provide the

- named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  3. Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  5. Basis of Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and characteristics based on the product named. Comply with requirements for consideration of an unnamed product by one of the named manufacturers.
- C. Visual Matching Specification: Where Specifications require "*match Architect's sample*", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with specified requirements, comply with requirements of Section 01 25 00 Substitution Procedures for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase *selected by Architect* or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

### 2.3 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents, will produce the indicated results, and that it is compatible with other portions of the Work.
  2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
  3. Evidence that proposed product provides specified warranty.
  4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
  5. Samples, if requested.

### PART 3 EXECUTION (NOT USED)

**SUBSTITUTION REQUEST FORM**

Substitution Request Number: \_\_\_\_\_

To: \_\_\_\_\_

Project Name/Number: \_\_\_\_\_

Item Specified:

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

Proposed Substitution (Manufacturer, Model # or Name, Color, Etc.): \_\_\_\_\_

History: \_\_\_ New Product, \_\_\_ Available 2-5 Years, \_\_\_ Available 6-10 Years, \_\_\_ Available 10+ Years

Provide UL, ITS, WHI, (or other) listing / rating of proposed substitution: \_\_\_\_\_

Attached data shall include, but not be limited to, product, specification, drawings, performance and test data adequate for evaluation of the request for the proposed substitution product and the specified product, with applicable portions of the proposed substitution and the specified product data clearly identified in a point-by-point direct comparison chart. Incomplete form and attachments will result in rejection of substitution request.

Requestor shall address the following items on this Substitution Request Form. Use a separate attached sheet attached as needed:

1. Reason for not providing specified item: \_\_\_\_\_

2. Will proposed substitution affect dimensions indicated on Drawings? \_\_\_(Yes) \_\_\_(No)

If yes, how? \_\_\_\_\_

3. Will proposed substitution affect Electrical, Mechanical, Structural, Architectural, etc.?

\_\_\_(Yes) \_\_\_(No) If yes, explain: \_\_\_\_\_

4. Is proposed substitution larger or smaller than specified product? \_\_\_(Yes) \_\_\_(No) If yes, state size of substitute product: \_\_\_\_\_

5. Does proposed substitution weight less/more than specified product? \_\_\_(Yes) \_\_\_(No) If yes, state weight of substitute product: \_\_\_\_\_

6. Will proposed substitution affect other trades and/or parts of the Work? \_\_\_\_ (Yes) \_\_\_\_ (No) If yes, explain all effects: \_\_\_\_\_  
\_\_\_\_\_
7. Comparison between proposed substitution and specified product (Similarities / Differences)?  
\_\_\_\_\_  
\_\_\_\_\_
8. If Substitution Request is accepted, County will receive a credit of \$ \_\_\_\_\_. The Contract Sum will be adjusted accordingly.
9. Will proposed substitution affect the Contract Time? \_\_\_\_ (Yes) \_\_\_\_ (No) If yes, \_\_\_\_ (Add) \_\_\_\_ (Deduct) \_\_\_\_\_ calendar days.

**INITIAL**

**UNDERSIGNED CERTIFIES:**

- \_\_\_\_\_ Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- \_\_\_\_\_ Proposed substitution has same or better warranty as specified product.
- \_\_\_\_\_ Proposed substitution has same or better maintenance service and availability of replacement parts as specified product.
- \_\_\_\_\_ Proposed substitution will not affect or delay the Construction Schedule.
- \_\_\_\_\_ Claims for additional costs related to accepted substitution, which may subsequently become apparent, are hereby waived.
- \_\_\_\_\_ Proposed substitution will not affect dimensions and functional clearances.
- \_\_\_\_\_ Coordination, installation, and changes in the Work as necessary for installation of accepted substitution will be complete in all respects, at no additional cost to County.
- \_\_\_\_\_ Contractor will pay for all costs associated with changes to the project's design, including, but not limited to, architectural or engineering design fees, detailing, Agency approvals and construction costs caused by the requested substitution.
- \_\_\_\_\_ The function, appearance and quality of the proposed substitution is equivalent or superior to the specified item.

The undersigned certifies that the above is accurate and correct:

Signature: \_\_\_\_\_

Printed Name: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_



\_\_\_\_\_  
Date: \_\_\_\_\_

Telephone: \_\_\_\_\_

Attachments: \_\_\_ Drawings \_\_\_ Product Data \_\_\_ Samples \_\_\_ Tests \_\_\_ Reports \_\_\_ Other (Describe)

Architect's Review and Action:

\_\_\_\_\_ Substitution Accepted – Make submittals in accordance with Specification Section 01 33 00.

\_\_\_\_\_ Substitution Accepted as Noted - Make submittals in accordance with Spec Section 01 33 00.

\_\_\_\_\_ Substitution Rejected – Provide specified product.

\_\_\_\_\_ Substitution Request Received Too Late – Provide specified product.

By: \_\_\_\_\_ Date: \_\_\_\_\_

Remarks: \_\_\_\_\_

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Field engineering and surveying.
  - 3. Installation of the Work.
  - 4. Coordination of Owner-installed products.
  - 5. Progress cleaning.
  - 6. Starting and adjusting.
  - 7. Protection of installed construction.

**1.2 DEFINITIONS**

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

**1.3 SUBMITTALS**

- A. Certificates: Submit certificate signed by land surveyor or professional engineer certifying that location and elevation of improvements comply with requirements.
- B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- C. Certified Surveys: Submit two copies signed by land surveyor.
- D. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

**1.4 QUALITY ASSURANCE**

- A. Land Surveyor Qualifications: A professional land surveyor legally qualified to practice in the State of California, who is experienced in providing land surveying services of the kind indicated.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

**PART 2 PRODUCTS**

**2.1 MATERIALS**

- A. Comply with requirements specified in other Sections.
- B. In Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible:

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not warranted. Before beginning site Work, investigate and verify existence and location of underground utilities, mechanical and electrical systems, and construction affecting the Work:
  1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water service piping; underground electrical services, and other utilities.
  2. Furnish location data for Work related to the Work that must be performed by public utilities serving the site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations:
  1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
  1. Description of the Work.
  2. List of detrimental conditions, including substrates.
  3. List of unacceptable installation tolerances.
  4. Recommended corrections.
- D. Proceed with installation after correcting unsatisfactory conditions. Proceeding with the Work indicates acceptance of surfaces and conditions.

#### **3.2 PREPARATION**

- A. Existing Utility Information: Furnish information to Owner necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the

control of Contractor, submit a request for information to Architect according to requirements in Section 01 31 00 Project Management and Coordination.

### **3.3 CONSTRUCTION LAYOUT**

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. Engage a land surveyor or professional engineer to lay out the Work using accepted surveying practices:
  - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as necessary to locate each element of Project.
  - 2. Establish limits on use of site.
  - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  - 4. Inform installers of lines and levels to which they must comply.
  - 5. Check the location, level and plumb, of every major element as the Work progresses.
  - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
  - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical Work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control Work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

### **3.4 FIELD ENGINEERING**

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations:
  - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
  - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark:
  - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
  3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other Work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and site work.
- E. Final Property Survey: Engage a land surveyor or professional engineer to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor or professional engineer, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey:
1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
  2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

### **3.5 INSTALLATION**

- A. Locate the work and components of the work accurately, in correct alignment and elevation, as indicated:
1. Make vertical work plumb and make horizontal Work level.
  2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  4. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions ensuring the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions:
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.

2. Allow for building movement, including thermal expansion and contraction.
  3. Coordinate installation of anchorages. 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.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
  - J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous. Materials containing asbestos and BCPs are prohibited.

### **3.6 OWNER INSTALLED PRODUCTS**

- A. Site Access: Provide access to site for Owner's construction personnel.
- B. Coordination:
  1. Coordinate construction and operations of the Work with Work performed by Owner's construction personnel:
    - a. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
    - b. Pre-installation Conferences: Include Owner's construction personnel at pre-installation conferences covering portions of the Work that are to receive Owner's Work. Attend pre-installation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

### **3.7 PROGRESS CLEANING**

- A. Clean site and Work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully:
  1. Comply with requirements in NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations, for removal of combustible waste materials and debris.
  2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 degrees F (27 degrees C).
  3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
  4. Use containers intended for holding waste materials of type to be stored.
  5. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain site free of waste materials and debris.
- C. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work:
  1. Remove liquid spills promptly.
  2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed Work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning

materials that are not hazardous to health or property and that will not damage exposed surfaces.

- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 50 00.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### **3.8 STARTING AND ADJUSTING**

- A. Coordinate startup and adjusting of equipment and operating components with mechanical, plumbing, and electrical requirements.
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00.

### **3.9 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Contractor shall be responsible for cutting, fitting and patching required to complete Work and to:
  - 1. Make its parts fit together properly.
  - 2. Uncover work to provide for installation of ill-timed work.
  - 3. Remove and replace defective work.
  - 4. Remove and replace work not conforming to Contract Documents.
  - 5. Remove samples of installed work as required for testing.
  - 6. Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.

**1.2 REQUESTS FOR INFORMATION**

- A. Submit a written request to Architect well in advance of executing cutting or alteration which affects:
  - 1. Work of Owner or separate contractor.
  - 2. Structural value or integrity of any element of Project.
  - 3. Integrity of weather-exposed or moisture-resistant elements.
  - 4. Efficiency, operational life, maintenance or safety of operational elements.
  - 5. Visual qualities of sight-exposed elements.
- B. Requests shall include:
  - 1. Identification of Project and description of affected work.
  - 2. Necessity for cutting or alteration.
  - 3. Effect on work of Owner or separate contractor.
  - 4. Effect on structural integrity, or weatherproof integrity of Project.
  - 5. Alternatives to cutting and patching.
  - 6. Cost proposal, when applicable.
  - 7. Written permission of separate contractor whose work will be affected.
  - 8. Description of proposed work including:
    - a. Scope of cutting, patching, alteration, or excavation.
    - b. Products proposed to be used.
    - c. Extent of refinishing to be included.



- C. Should conditions of Work or schedule indicate a change of products from original installation, Contractor shall submit request for substitution as specified in Section 01 62 00 - Product Options.
- D. Submit written notice to Architect designating date and time that work will be uncovered.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Comply with Specifications and standards for each specific product involved.
- B. Where Specifications and standards have not been provided, provide materials and fabrication consistent with quality of Project and intended for commercial construction.
- C. Provide new materials for cutting and patching unless otherwise indicated.

## **PART 3 - EXECUTION**

### **3.1 INSPECTION**

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

### **3.2 PREPARATION**

- A. Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of Work.
  - 1. Provide services of licensed engineer for designing temporary support where required by applicable authorities for temporary supports and for shoring; submit engineering calculations directly to applicable authorities upon request.
- B. Protect other portions of Project from damage.

### **3.3 PERFORMANCE**

- A. Execute cutting by methods that provide proper surfaces to receive installation of repairs and finishes.
  - 1. Execute excavating and backfilling by methods which will prevent settlement and which will prevent damage to other work.
- B. Employ same installer or fabricator to perform cutting and patching work as employed for new construction for:
  - 1. Weather-exposed or moisture resistant elements.
  - 2. Sight-exposed finished surfaces.

- C. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finishes.
- D. Restore work that has been cut or removed; install new products to provide completed Work in accordance with requirements of Contract Documents.
- E. Fit work tight to pipes, sleeves, ducts, conduit and penetrations through surfaces.
- F. Refinish entire surfaces as necessary to provide even finish to match adjacent finishes:
  - 1. For continuous surfaces, refinish to nearest intersection.
  - 2. For an assembly, refinish entire unit.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes administrative and procedural requirements for the following:
  - 1. Salvaging nonhazardous demolition and construction waste.
  - 2. Recycling nonhazardous demolition and construction waste.
  - 3. Disposing of nonhazardous demolition and construction waste.

**1.2 DEFINITIONS**

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging. Alternative Daily Cover (ADC) does not qualify as material diverted from disposal. Land-clearing debris is not considered construction, demolition, or renovation waste that can contribute to waste diversion.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

**1.3 PERFORMANCE REQUIREMENTS**

- A. General: Develop and implement a construction and demolition waste management plan that results in end-of-Project rates for salvage/recycling of at least **75** percent by weight of total waste generated by the Work.

**1.4 SUBMITTALS**

- A. Waste Management Plan: Submit 3 copies of plan within 14 days of date established for the Notice to Proceed.
- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three copies of report. Include separate reports for demolition and construction waste. Include the following information:
  - 1. Material category.
  - 2. Generation point of waste.

3. Total quantity of waste in tons.
  4. Quantity of waste salvaged, both estimated and actual in tons.
  5. Quantity of waste recycled, both estimated and actual in tons.
  6. Total quantity of waste recovered (salvaged plus recycled) in tons.
  7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- C. Waste Reduction Calculations: Before request for Substantial Completion, submit three copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- H. Qualification Data: For Waste Management Coordinator.
- I. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

### **1.5 QUALITY ASSURANCE**

- A. Waste Management Coordinator Qualifications: Minimum 2 years construction experience.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Waste Management Conference: Conduct conference at Project site.

### **1.6 WASTE MANAGEMENT PLAN**

- A. General: Develop plan consisting of waste identification and waste reduction work plan. Include separate sections in plan for demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates. Identify at least five materials (both structural and nonstructural) targeted for diversion.

- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures. Specify whether materials will be separated or comingled.
1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
  2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
  3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
  4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
  5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
  6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

**3.1 PLAN IMPLEMENTATION**

- A. General: Implement waste management plan as approved by Architect. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
1. Distribute waste management plan to everyone concerned within three days of submittal return.
  2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
  2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

### 3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work:
  - 1. Clean salvaged items.
  - 2. Pack or crate items after cleaning. Identify contents of containers.
  - 3. Store items in a secure area until installation.
  - 4. Protect items from damage during transport and storage.
  - 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Sale and Donation: Not permitted on Project site.
- C. Salvaged Items for Owner's Use:
  - 1. Clean salvaged items.
  - 2. Pack or crate items after cleaning. Identify contents of containers.
  - 3. Store items in a secure area until delivery to Owner.
  - 4. Transport items to Owner's storage area on-site.
  - 5. Protect items from damage during transport and storage.

### 3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling waste materials shall accrue to Contractor.
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
  - 1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
    - a. Inspect containers and bins for contamination and remove contaminated materials if found.
  - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
  - 4. Store components off the ground and protect from the weather.
  - 5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

### 3.4 RECYCLING DEMOLITION WASTE

- A. Asphaltic Concrete Paving: Grind asphalt to maximum 1-1/2-inch size, or as required by recycling facility.
- B. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.

- C. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
  - 1. Pulverize concrete to maximum 1-1/2-inch size, or as required by recycling facility.
- D. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
  - 1. Pulverize masonry to maximum 1-1/2-inch size, or as required by recycling facility.
  - 2. Clean and stack undamaged, whole masonry units on wood pallets.
- E. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- F. Metals: Separate metals by type.
  - 1. Structural Steel: Stack members according to size, type of member, and length.
  - 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- G. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.
- H. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
- I. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
  - 1. Separate suspension system, trim, and other metals from panels and tile and sort with other metals.
- J. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
  - 1. Store clean, dry carpet and pad in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.
- K. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- L. Plumbing Fixtures: Separate by type and size.
- M. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- N. Lighting Fixtures: Separate lamps by type and protect from breakage.
- O. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panel boards, circuit breakers, and other devices by type.
- P. Conduit: Reduce conduit to straight lengths and store by type and size.

**3.5 RECYCLING CONSTRUCTION WASTE**

- A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
  2. Polystyrene Packaging: Separate and bag materials.
  3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
  4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Site-Clearing Wastes: Chip brush, branches, and trees on-site at location indicated by owner.
- C. Wood Materials:
1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
  2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- D. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.
1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

### **3.6 DISPOSAL OF WASTE**

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
  2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Burning: Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.
- D. Disposal: Transport waste materials and dispose of at designated spoil areas on Owner's property.
- E. Disposal: Transport waste materials off Owner's property and legally dispose of them.

**END OF SECTION**



**PART 1 GENERAL**

**1.1 PRE-CLOSEOUT MEETING**

- A. Pre-Closeout Meeting: Schedule and convene Pre-Closeout Meeting with Owner and Architect in accordance with Section 01 31 00, "Project Management and Coordination."

**1.2 SUBSTANTIAL COMPLETION**

- A. The items listed in the Supplementary Conditions and the following items shall be completed before Substantial Completion will be granted:
  - 1. Contractor's Completion List (Punch List): Submit a thorough list of items to be completed or corrected, along with a written request for Substantial Completion and for review of the Work or portion of the Work. The Architect/Engineer's Project Representative, at their discretion, may attend and assist in the preparation of the Contractor's Punch List.
  - 2. Architect's Supplemental Punch List: The Architect/Engineer, along with the Owner at the Owner's discretion, will inspect the Work utilizing the Contractor's prepared Punch List, noting completed items and incomplete items, and will prepare a supplemental list of items that have been omitted or incomplete items that were not previously noted.
  - 3. Operations and Maintenance Manuals: Submit as described in paragraph 1.4.
  - 4. Final Cleaning: Provide final cleaning and adequate protection of installed construction as described in paragraph 1.7 and 1.8.
  - 5. Starting of systems: Start up equipment and systems as described in paragraph 1.9.
  - 6. Testing and balancing: Testing and balancing of systems must be performed and completed, and the report submitted and accepted by Architect/Engineer and Owner, as described in the Contract Documents. Make adjustments to equipment as required to achieve acceptance.
  - 7. Mechanical Acceptance Testing per Energy Code Section 120.5 must be completed prior to occupancy.
  - 8. Demonstrations: If required by individual specification sections or by Owner, provide demonstrations and instructions for use of equipment as described in paragraph 1.10.
- B. Date of Substantial Completion: Complete or correct items identified on Punch List and confirm that all items have been corrected prior to Architects re-inspection. Architect/Engineer, along with the Owner, will re-inspect the corrected work to establish the Date of Substantial Completion. Incomplete items remaining will be appended to the Certificate of Substantial Completion. The Date of Substantial Completion represents day one (1) of the closeout period, and represents the date of commencement of the Contractors correctional period and all warranty periods as described and required by the Contract Documents, except as amended in the Certificate of Substantial Completion and elsewhere in the Contract Documents.
- C. Certificate of Substantial Completion: When the Work or designated portion thereof is substantially complete, Architect will prepare the Certificate of Substantial Completion to be executed by the Owner and Contractor. Items on the appended Punch List shall be completed or corrected within the time limits established in the Certificate.

**1.3 PUNCH LIST**

- A. A comprehensive list prepared by the Contractor prior to Substantial Completion, and attached thereto, to establish all items to be corrected, or limited items of work to be completed, if any. This list is intended to represent a limited number of items needing attention.

- B. Punch lists shall be furnished to the Architect in Microsoft Excel and PDF formats. The punch list shall be in matrix form and shall include the following information for each punch list item:
  - 1. Room number or other suitable location identifier.
  - 2. Description of the work.
  - 3. Sub-contractor/trade sign-off that the work has been verified to be 100% complete and in accordance with the Contract Documents.
  - 4. Sub-contractor/trade sign-off date.
  - 5. General contractor sign-off that the work has been verified to be 100% complete and in accordance with the Contract Documents.
  - 6. General contractor/trade sign-off date.
  - 7. A/E consultant sign-off.
  - 8. A/E consultant sign-off date.
  - 9. If requested by the Owner, provide two additional similar columns for their sign-off.
  - 10. In the case of excessive repetition of the same item at various locations, the punch list may contain "general notes/items" that shall be applied to the entire project; and it shall be the responsibility of the contractor/sub-contractor to thoroughly examine the entire project and make corrective measures at all applicable locations.
  
- C. Should the Architect determine that the Contractor's punch list lacks sufficient detail or requires extensive supplementation, the punch list will be returned to the Contractor for re-inspection and revision. The date of Substantial Completion will be delayed until the punch list submitted is a reasonable representation of the work to be done.
  
- D. A significantly large number of items to be completed or corrected will preclude the Architect from issuing a Certificate of Substantial Completion. The Owner and Architect will be the sole judge of what constitutes a significantly large number of items. It is anticipated that the detailed list of items of work to be completed or corrected at the Date of Substantial Completion shall be no longer than five (5) typed pages.
  
- E. The Contractor's superintendent shall participate in the preparation of the Contractor's punch list that is submitted to the Architect and Owner for supplementation. Upon receipt, the Architect and Consultants shall perform a spot review to determine the adequacy and completeness of the Contractor's punch list.
  
- F. Upon receipt of an acceptable Contractor's punch list, the Contractor's Superintendent shall accompany the Architect, his Consultants and the Owner (at his discretion) during their observation and the preparation of their supplements to the Contractor's punch list.
  - 1. The Superintendent shall record or otherwise take note of all supplementary items.
  - 2. The Architect will endeavor to furnish to the Contractor typed, hand written or recorded supplements to the punch list in a prompt manner; however, any delay in the Contractor's receiving said supplements from the Architect will not be cause for a claim for additional cost or extension of time as the Contractor's Superintendent shall have been in attendance during the inspections of the Architect and his Consultants and will have been expected to take his own notes.

#### **1.4 OPERATIONS AND MAINTENANCE MANUAL**

- A. As a requirement for Substantial Completion, the final Operation and Maintenance Manual shall be submitted to, and reviewed and accepted by the Architect prior to issuance of the Certificate.
  
- B. Prepare 3-ring D-slant binder cover and spline with printed title "OPERATIONS AND MAINTENANCE MANUAL", title of project, and subject matter of binder when multiple binders are required.

- C. Submit one (1) copy of preliminary Operations and Maintenance Manuals to respective consultants (Civil, MEP, Structural, *etc.*) for review of conformance with contract requirements prior to submitting final to Architect. Allow time for proper review.
- D. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- E. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- F. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
  - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
  - 2. Part 2: Operation and Maintenance, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
    - a. Significant design criteria.
    - b. List of equipment.
    - c. Parts list for each component.
    - d. Equipment start-up instructions
    - e. Operating instructions.
    - f. Maintenance instructions for equipment and systems.
    - g. Maintenance instructions for finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
  - 3. Part 3: Project documents and certificates, including the following:
    - a. Product data.
    - b. Air and water balance reports.
    - c. Photocopies of warranties, certificates and bonds. Submit originals with Closeout Documents as specified below.
- G. Submit one (1) final original and two (2) copies to Architect.
- H. Contractor shall provide a usb drive, or other form of digital media acceptable to the Owner, with files in PDF Format, the following documents after approval by the Architect, Consultants and Owner: closeout manual, MSDS binder, O&M Manuals, specifications and approved submittals. Documents shall be hyper-linked to the Table of Contents.

## **1.5 PROJECT CLOSEOUT**

- A. Final Payment will not be authorized by the Architect until the Architect finds the Work acceptable under the Contract Documents, subject to the completion and acceptance of the following requirements and other applicable Contract requirements:
  - 1. Close-out Documents: Provide bound closeout documents.
  - 2. Record Documents.
  - 3. Extra materials: Provide extra stock, materials, and products.
  - 4. Locks: Make final changeover of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of changeover in security provisions.
  - 5. Temporary Facilities: Discontinue and remove temporary facilities from the site, along with mockups, construction aids, and similar elements.
  - 6. Warranties, Certificates and Bonds: Execute and assemble transferable warranty documents, certificates, and bonds from subcontractors, suppliers, and manufacturers.
  - 7. Final Inspection and Acceptance by Owner's Representative.

1.6 CLOSEOUT DOCUMENTS

- A. Coordinate the following items with the requirements of Document CB, Supplementary Conditions of the Contract.
- B. Prepare 3-ring D-slant binder cover and spline with printed title "CLOSEOUT DOCUMENTS", title of project, and subject matter of binder when multiple binders are required. Submit one (1) original and two (2) copies.
- C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. The close-out documents shall be neatly organized and easily useable as determined by the Architect and Owner. Separate Close-out Documents binders from Operations and Maintenance Manuals. Documents identified as "affidavit" shall be notarized.
- E. Contents: Prepare Table of Contents for each volume, with each item description identified, typed on white paper, in five (5) parts as follows:
  - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers. All General Contractor's vendors/suppliers and subcontractors that provided materials or performed any work related to this project must be listed on this form. Submit Final List of Subcontractors.
  - 2. Part 2: Closeout Documents and Affidavits, include the following:
    - a. Consent of Surety to Final Payment;
    - b. Contractor's Affidavit of Payment of Debts and Claims;
    - c. Contractor's Affidavit of Release of Liens;
  - 3. Part 3: Project documents and certificates, including the following:
    - a. Copy of Certificate of Substantial Completion (AIA G704);
    - b. Copy of All Permits;
    - c. Copy of Final Utility Bill or letter of transfer;
    - d. Copy of Certificate of Occupancy;
    - e. Copy of Certification of Project Compliance: Owner and Architect will initiate form and forward to Contractor for signature once Substantial Completion is established. (Owner to be provided original separately);
  - 4. Part 4: Warranties, Release of Liens, compile sequentially based on specification sections:
    - a. General Contractor's Warranty: Submit on company letterhead as described below. This Warranty shall state all sections of Work performed by General Contractor's own forces, and warranty period for each section of Work;
    - b. Subcontractor's Release of Lien: Include contractors, subcontractor's and direct material and equipment supplier's separate final releases.
    - c. Hazardous Material Certificate: Affidavits from Contractor, Subcontractors and General Contractor's vendors or suppliers stating that no hazardous materials/products have been used or installed in this project.
    - d. Subcontractor's Warranty: notarized, and submitted. This Warranty shall state all sections of Work performed by the subcontractor and warranty period.
    - e. Special / Extended Warranties; List and provide, notarized warranties requested by Owner, or required by or incorporated in the Contract Documents.
    - f. Spreadsheet depicting all items and materials that carry a warranty longer than one (1) year. Include information consisting of material/ supplier/ installer/ specification section/ length of warranty and contact information.
  - 5. Part 5: Receipts:
    - a. Extra Stock: Provide original receipts for delivery of "Extra Stock" items as described below. Receipts must be signed by an authorized Owner's representative;

- b. Keys: Provide original receipts for delivery of "Keys". Receipts must be signed by an authorized Owner's representative.
  - c. Sign in sheets: provide signatures of attendees from all demonstrations.
- F. In addition to the three (3) required close-out binders listed above, provide Architect with one (1) separate binder for their records containing the following:
- 1. Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers;
  - 2. All MSDS sheets for the project;
  - 3. All warranties from Contractor, subcontractors, direct suppliers, and manufacturers.
- G. Failure to complete and close-out project after substantial completion may result in liquidated damages being assessed to the Contractor. Refer to Conditions of the Contract for additional requirements and liquidated damages.

### **1.7 FINAL CLEANING**

- A. Execute final cleaning prior to final project inspection and acceptance.
- B. Clean interior and exterior glass, and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces, mop hard floor surfaces.
- C. Remove smudges, marks, stains, fingerprints, soil, dirt, spots, dust, lint, and other foreign materials from finished and exposed surfaces
- D. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.
- E. Clean and replace filters of operating equipment as required by Contract Documents
- F. Clean debris from roofs, gutters, downspouts, and drainage systems.
- G. Clean site; sweep paved areas, rake clean landscaped surfaces.
- H. Remove waste and surplus materials, rubbish, and temporary construction facilities from site.

### **1.8 PROTECTING INSTALLED CONSTRUCTION**

- A. Protect installed Work and provide special protection where specified in individual specification sections until Work is accepted by Architect and Owner.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

- F. Prohibit traffic from landscaped areas.

### **1.9 STARTING OF SYSTEMS**

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect/Engineer and Owner 48 hours prior to start-up of each item.
- C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.
- E. Verify wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of Contractors' personnel, and installer in accordance with manufacturers' instructions.
- G. When specified in individual specification sections or required by manufacturer, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. When specified in individual specification sections or required by Owner or Architect/Engineer, submit a written report, that equipment or system has been properly installed and is functioning correctly.

### **1.10 DEMONSTRATION AND INSTRUCTIONS**

- A. Demonstrate operation and maintenance of products to Owner's personnel a minimum of 48 hours prior to date of Final Completion in accordance with Owner's requirements.
- B. Demonstrate Project equipment instructed by qualified manufacturer's representative who is knowledgeable about the Project and equipment.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six (6) months.
- D. Utilize maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel to explain all aspects of operation and maintenance.
- E. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment.
- F. Prepare and insert additional data in maintenance manuals when need for additional data becomes apparent during instruction.
- G. Review and verify proper start-up and operation of equipment prior to scheduling demonstrations with Owner.
- H. All demonstrations are to be documented by video and submitted to the Owner in DVD format along with the close out documents. General contractor is responsible for all video and compilation onto DVD with linked menus.

**1.11 PROJECT RECORD DOCUMENTS**

- A. Project Record Documents, as described in Section 01 78 39, shall be submitted at Project Closeout. Final Payment will not be authorized by the Architect until final review and acceptance by Architect and Engineers is achieved in accordance with the Owners requirements.
- B. At the Contractors request, and with associated fee, Architect may provide electronic versions of the construction drawing and specification files for Contractors use, subject to the terms and conditions of Architects standard electronic document transfer agreement.
- C. Submit reproducible to respective consultants (Civil, Structural, MEP, *etc.*) for review. Consultant will mark-up corrections and return to Contractor for final revisions. Make final revisions prior to submitting to Architect.
  - 1. Format: One (1) set of film positive reproducibles and two (2) sets bluelines of approved reproducibles.
  - 2. Provide the Owner with one (1) set of Record Drawings on a non-rewritable CD in AutoCAD® latest release.
  - 3. Provide the Owner with one (1) set of Record Drawings on electric media format acceptable by Owner.
  - 4. Label electronic CAD files and PDF files in the same manner as the sheets (example, A2.02 First Floor Area 'A', *etc.*)

**1.12 EXTRA STOCK, MATERIALS AND MAINTENANCE PRODUCTS**

- A. Furnish extra stock, maintenance, and extra products in quantities specified in individual specification sections.
- B. Deliver to Project site or to Facility Maintenance Department as directed by Owner; obtain signed receipt from Owner's authorized representative prior to final application for payment. Delivery of materials to, or obtaining receipt from anyone other than Owner's authorized representative may constitute breach of this requirement and may require delivery of additional materials at no cost to the Owner if original materials are misplaced.
- C. Include signed receipts for delivery of extra stock and materials, including keys, with Closeout Documents.

**1.13 WARRANTIES, CERTIFICATES AND BONDS**

- A. Definitions:
  - 1. Standard Product Warranties: preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
  - 2. Special Warranties: Written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide coverage of specific defects, or both.
- B. In accordance with the general warranty obligations under Paragraph 3.5 of the General Conditions as amended by the Supplementary Conditions, the General Contractor's warranty shall be for a period of one (1) year following the date of Substantial Completion, hereinafter called the one-year warranty period. The Contractors one-year general warranty shall include all labor, material and delivery costs required to correct defective material and installation. This warranty shall not limit the Owner's rights with respect to latent defects, gross mistakes, or fraud.

- C. The Contractor's one-year warranty shall run concurrently with the one (1) year period for correction of Work required under Paragraph GC13 of the General Conditions.
- D. No service charges or call out charges are allowed to investigate warranty claims.
- E. In addition to the Contractor's one-year warranty, Special Warranties as described in individual specifications sections, shall extend the warranty period for the period specified without limitation in respect to other obligations which the Contractor has under the Contract Documents.
- F. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve the suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.
- G. Warranty Requirements:
  - 1. When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
  - 2. When Work covered by a warranty has failed and been corrected by replacement or reconstruction, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
  - 3. Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.
  - 4. Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
  - 5. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or designated portion of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.
- H. Compile copies of each required warranty properly executed by the Contractor and the subcontractor, supplier, or manufacturer. Verify documents are in proper form, contain full information, and are notarized. Co-execute warranties, certificates and bonds when required and include signed warranties with Closeout Documents submitted to the Architect.

#### **1.14 FINAL COMPLETION AND FINAL PAYMENT**

- A. Final Notice and Inspection:
  - 1. When all items on the Punch List have been corrected, final cleaning has been completed, and installed work has been protected, submit written notice to the Architect that the Work is ready for final inspection and acceptance.
  - 2. Upon receipt of written notice that the Work is ready for final inspection and acceptance, the Architect and Engineer will make final inspection.
- B. Final Change Order: When the Project Closeout items described above are successfully completed and the Work is found acceptable to Architect/Engineer and Owner, a Final Change Order will be executed. This Change Order will include any Allowance adjustments as required by the Contract Documents.



- C. Final Application for Payment: When all of the above items are successfully complete, submit to the Architect a final Application for Payment and request for release of retainage.
- D. Release of Retainage: Release of retainage will not be authorized by the Architect until Contractor completes all requirements for close-out to the satisfaction of the Owner and Architect as described herein.

**1.15 TERMINAL INSPECTION**

- A. Immediately prior to expiration of the one (1) year period for correction of the Work, the Contractor shall make an inspection of the work in the company of the Architect and the Owner. The Architect and the Owner shall be given not less than ten (10) days' notice prior to the anticipated date of terminal inspection.
- B. Where any portion of the work has proven to be defective and requires replacement, repair or adjustment, the Contractor shall immediately provide materials and labor necessary to remedy such defective work and shall execute such work without delay until completed to the satisfaction of the Architect and the Owner, even if the date of completion of the corrective work may extend beyond the expiration date of the correction period.
- C. The Contractor shall not be responsible for correction of work which has been damaged because of neglect or abuse by the Owner nor the replacement of parts necessitated by normal wear in use.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

## PART 1 GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section Includes: Administrative and procedural requirements for project record documents, including but not limited to:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
  - 4. Miscellaneous record submittals.

### 1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings:
  - 1. Number of Copies: Submit one set of marked up record prints.
  - 2. Number of Copies: Submit copies of record Drawings:
    - a. Initial Submittal:
      - 1) Submit PDF electronic files of scanned record prints and one of file prints.
      - 2) Submit record digital data files and one sets of plots.
      - 3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
    - b. Final Submittal:
      - 1) Submit PDF electronic files of scanned record prints and three sets of prints.
      - 2) Submit record digital data files and three sets of record digital data file plots.
      - 3) Plot each drawing file, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit one paper copy and one annotated PDF electronic files of the Project Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one paper copy and one annotated PDF electronic files and directories of each submittal.
  - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: Refer to the individual Specification Sections for miscellaneous record keeping requirements and submittals in connection with various construction activities. Submit one paper copy and annotated PDF electronic files and directories of each submittal.
- E. Reports: Submit written report monthly indicating items incorporated into project record documents concurrent with progress of the work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

### 1.4 PROJECT RECORD DOCUMENT PROCEDURES

- A. Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference.

1. **Do not use** As Built Drawings and Specifications for Record Drawings and Specifications.
- B. Recording Procedures: Update drawings and specifications on daily bases to record actual conditions. Record information concurrently with construction progress. Do not conceal work until required information is accurately recorded.
- C. Store Record Documents and samples apart from as built documents used for construction.
  1. Label and file Record Documents and samples in accordance with section number listings in Table of Contents. Label each document **PROJECT RECORD** in neat, large, printed letters.
  2. Maintain Record Documents in clean, dry and legible condition.
  3. Make Record Documents and samples available for inspection upon request of Owner and/or Architect.

## PART 2 PRODUCTS

### 2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked up paper copies of the Contract Drawings and Shop Drawings.
  1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked up record prints. Show actual installation conditions where installation varies from that shown originally.
    - a. Give attention to information on concealed elements difficult to identify or measure and record later.
    - b. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross reference record prints to corresponding shop drawings or archive photographic documentation.
  2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations below first floor.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made by Change Order or Construction Change Directive.
    - k. Changes made following Architect's written orders.
    - l. Details not on the original Contract Drawings.
    - m. Field records for variable and concealed conditions.
    - n. Record information on the work that is shown only schematically.
  3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked up record prints.
  4. Mark record sets with erasable, red colored pencil. Use colors to distinguish between changes for different categories of the work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.

6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked up record prints with Architect. When authorized, prepare full set of corrected digital data files of the Contract Drawings:
1. Format: Same digital data software program, version, and operating system as the original Contract Drawings and annotated PDF electronic file with comment function enabled.
  2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
  3. Refer instances of uncertainty to Architect for resolution.
  4. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.
    - a. Refer to Section 01 33 00; Submittal Procedures for requirements related to use of Architect's digital data files.
    - b. Architect will provide data file layer information. Record markups in separate layers.
- C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or modification. Including ALL documents used for Construction Change directive to the AHJ.
  2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- D. Format: Identify and date each record Drawing; include the designation *PROJECT RECORD DRAWING* in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  2. Format: Annotated PDF electronic file with comment function enabled.
  3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
  4. Identification: As follows:
    - a. Project and Owner name.
    - b. Date.
    - c. Designation PROJECT RECORD DRAWINGS.
    - d. Name of Architect.
    - e. Name of Contractor.

## **2.2 RECORD SPECIFICATIONS**

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications. Indicate actual product installation where installation varies from that indicated in Specifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
  3. Record the name of manufacturer, supplier, Installer, and other information necessary

- to provide a record of selections made.
- 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
- 5. Note related Change Orders, record Product Data, and record Drawings where applicable.

- B. Format: Submit record Specifications as annotated PDF electronic file and marked up paper copy of Specifications. ALL documents to match NMR format.

### **2.3 RECORD PRODUCT DATA**

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
  - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
  - 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Product Data as annotated PDF electronic file. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

### **2.4 RECORD SAMPLES**

- A. Record Samples: Determine with Architect and Owner which submitted Samples are to be maintained as Record Samples. Maintain and mark one set to indicate date of review and approval by Architect; note any deviations or variations between reviewed sample and installed product or material.

### **2.5 MISCELLANEOUS RECORD SUBMITTALS**

- A. Assemble miscellaneous records required by the individual Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the work. Bind or file miscellaneous records and identify each, ready for continued use and reference. Include the following:
  - 1. Reviewed shop drawings, product data, and samples.
  - 2. Field test reports.
  - 3. Inspection certificates and manufacturer's certificates.
  - 4. Inspections by authorities having jurisdiction (AHJ).
  - 5. Documentation of foundation depths.
  - 6. Special measurements or adjustments.
  - 7. Tests and inspections.
  - 8. Surveys.
  - 9. Design mixes.
- B. Format: Submit miscellaneous record submittals as scanned PDF electronic file(s) of marked up miscellaneous record submittals. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

## **PART 3 EXECUTION**

### **3.1 RECORDING AND MAINTENANCE**

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 DESCRIPTION**

- A. This section describes the requirements for common work related to concrete including, but not limited to bonding agents, chemical floor hardeners and cold and hot weather concreting.

### **1.2 RELATED WORK**

- A. Division 1 – General Requirements
- B. Division 3 - Concrete

### **1.3 REFERENCES**

- A. ACI 301 – Specifications for Structural Concrete Buildings
- B. CBC Chapter 19
- C. ACI 318 – Building Code Requirements for Structural Concrete
- D. ACI 305 – Hot Weather Concreting
- E. ACI 306 – Cold Weather Concreting

### **1.4 SUBMITTALS**

All submittals shall be submitted under the provisions of Division 1 - General Requirements.

- A. Product Data:
  - 1. Manufacturer's product data and specifications with application and installation instructions for proprietary materials and items, including admixtures, bonding agents, water stops, joint systems, chemical floor hardeners, and dry shake finish materials.

### **1.5 QUALITY ASSURANCE**

- A. Perform Work in accordance with ACI 301 and ACI 318 Chapter 4.
- B. Obtain materials from the same source throughout the Work.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- A. Bonding Agent:
  - 1. Bonding Materials: Polyvinyl acetate, rewettable type. Use in areas not subject to moisture.
  - 2. Bonding Compound: Latex, non-rewettable type.
  - 3. Bonding Admixture: Latex, non-wettable type.
  - 4. Structural Bonding Epoxy Adhesive: Two-component, 100-percent solids, 100-percent reactive compound suitable for use on dry or damp surfaces.
  - 5. Patching Compound: Free-flowing, polymer-modified cementitious coating.

- B. Non-metallic Light Reflective Hardener:
  - 1. Premixed, packaged dry shake, natural aggregate hardener with cleaned and finely graded silica aggregates, color pigments, and a high-strength cementitious binder. Apply to fresh concrete slabs where indicated on the Finish Schedule. Apply in accordance with the Hardener manufacturer's recommendations. The application shall be by mechanical spreader, except in areas where machine application is impossible. Seal and cure concrete in accordance with the Hardener manufacturer's recommendations. Cover or otherwise protect areas receiving hardener from spills, dirt, debris, and abrasions after installation. Color to be selected by Architect from the manufacturer's standard palette.

### PART 3 EXECUTION

#### 3.1 PREPARATION

- A. Bonding: Roughen surface of set concrete at joints, except where bonding is obtained by use of concrete bonding agent, and clean surfaces of laitance, coatings, loose particles, and foreign matter.
  - 1. Roughen surfaces to expose bonded aggregate uniformly; leave no laitance, loose particles of aggregate, or damaged concrete at the surface.
  - 2. Bond fresh concrete to new concrete that has set but is not fully cured, as follows:
    - a. At joints between footings and walls or columns, and between walls or columns and beams or slabs they support, and elsewhere unless otherwise specified. Dampen, but do not saturate, roughen, and clean the surface of the set concrete immediately before placing fresh concrete.
    - b. At joints in exposed work, at vertical joints in walls, at joints in girders, beams, supported slabs, and other structural members, and at joints designed to contain liquids, apply a commercial bonding agent or neat cement grout to roughened and cleaned surface of set concrete.
      - 1) Apply a commercial bonding agent in accordance with the manufacturer's printed instructions.
      - 2) Apply neat cement grout, consisting of equal parts of portland cement and aggregate mixed with water to a consistency of thick cream, to the dampened concrete surfaces with a stiff brush to a minimum thickness of 1/16 inch. Deposit fresh concrete before the grout has attained its initial set.
  - 3. Bond fresh concrete to fully cured hardened concrete or existing concrete. Before depositing fresh concrete, thoroughly roughen and clean hardened surfaces.
  - 4. Bond curbs and equipment pads to base slabs with bonding agent in accordance with the manufacturer's directions.
  - 5. Topping Slab: Prior to placement of metallic floor topping, the base slab shall be cleaned, dampened, and bonding compound or epoxy adhesive applied. Place topping mix after the rewettable bonding compound has dried or while the polymer bonding compound or epoxy adhesive is still tacky.
- B. Cold Weather Placing: Protect concrete work from damage or reduced strength caused by frost, or low temperatures, in compliance with the requirements of ACI 306 and as specified.
  - 1. When air temperature has fallen to or is expected to fall below 40 deg. F., uniformly heat water and aggregates before mixing to obtain a concrete placement temperature of not less than 50 deg. F. and not more than 80 deg. F.
  - 2. Verify that forms, reinforcing steel, and adjacent concrete surfaces are free of frost before placing concrete.
  - 3. Only the specified non-corrosive non-chloride accelerator shall be used. Calcium chloride, thiocyanates, or admixtures containing more than 0.05-percent chloride ions are not permitted.



- C. Hot Weather Placing: When hot weather conditions exist that would impair the quality and strength of concrete, place it in compliance with ACI 305, and as specified.
  - 1. Cool ingredients before mixing to maintain concrete placement temperature below 90 deg. F. Mixing water may be chilled, or chopped ice may be used provided water equivalent of ice is calculated to the total amount of mixing water.
  - 2. Cover reinforcing steel with water-soaked burlap so that steel temperature will not exceed ambient air temperature immediately before embedment in concrete.
  - 3. Fog spray forms, reinforcing steel and subgrade just prior to placing concrete.
  - 4. Use water reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions.
  
- D. In case of rain or inclement weather, freshly poured concrete shall be protected against infiltration of external water. Placing shall be terminated against nearest construction joint bulkhead and covered at once with tarpaulins or similar waterproof protection until concrete has set.

**END OF SECTION**

## PART 1 GENERAL

### 1.1 DESCRIPTION

- A. This Section describes the requirements for providing concrete formwork, shoring and reshoring for cast-in-place concrete, and installation of items furnished by others, including anchor bolts, setting plates, bearing plates, anchorages, inserts, frames, nosings, and other items to be embedded in concrete.
- B. Related Sections:
  - 1. Division 1 – General Requirements
  - 2. Division 3 - Concrete

### 1.2 QUALITY ASSURANCE

- A. Allowable Tolerances: Design, construct, set, and maintain the formwork to ensure completed work meets the suggested tolerance limits specified in ACI 347.
- B. Placement:
  - 1. Before placement, check the lines and levels of erected formwork. Make corrections and adjustments to ensure the proper size and location of concrete members and the stability of forming systems.
  - 2. During placement, check formwork and related supports to ensure that forms are not displaced, and that completed work will be within specified tolerances.

## PART 2 PRODUCTS

### 2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal framed, plywood faced, or other panel-type materials provided as cast surfaces.
  - 1. Furnish in the largest sizes to minimize the number of joints and conform to the joint system shown on drawings.
  - 2. Provide form material with sufficient thickness to withstand the pressure of placed concrete without bow or deflection beyond allowable tolerances.
  - 3. Plywood: APA grade B-B Plyform Class 1, not less than 5/8 inch thick; solid one side, sound undamaged sheets with straight edges.
- B. Earth Forms: Unless otherwise indicated or required, concrete for footings may be placed directly against vertical excavated surfaces, provided the material will stand without caving, that minimum reinforcing steel clearances indicated are maintained, and suitable provisions are taken to prevent raveling of top edges or sloughing of loose material from walls of the excavation. Sides of excavation shall be made with a neat cut, and the width made as indicated. Concrete, which is exposed to view on the exterior, shall be formed to a minimum depth of 6 inches below the finished grade.
- C. Lumber: Douglas Fir species; No. 1 or No. 2 grade with grade stamp clearly visible
- D. Forms for Textured Finish Concrete: Special forming materials to produce surfaces with face design, arrangement, and configuration shown or required to meet Architect's control sample. Provide solid backing and form supports to ensure the stability of textured form liners.

- E. Corrugated Steel Forms: Fabricate of galvanized steel sheets. Metal gauge not less than 20 gauge unless heavier gauge required, or as indicated.
- F. Cylindrical Forms:
  - 1. Heavy glass fiber reinforced plastic or galvanized steel sheets.
  - 2. Butt sections together, with bolted or keyed joints.
  - 3. Finish interior joints of forms smooth, so there is no visible seam on finished concrete surfaces.
- G. Form Ties: Factory fabricated, adjustable length cone type, removable or snap-off metal form ties, designed to prevent deflection and to prevent spalling concrete surfaces upon removal.
  - 1. Unless otherwise shown, provide ties so that portions remaining within the concrete after removal of exterior parts are 1 inch from the outer concrete surface.
  - 2. Unless otherwise indicated, provide form ties, which will leave a hole not larger than 1-inch diameter in the concrete surface.
  - 3. Form ties fabricated on the project site, and wire ties are not acceptable.
- H. Form Release Agent: Commercial formulation release agent that will not bond with, stain, nor adversely affect concrete surfaces; will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede wetting of surfaces to be cured with water or curing compounds. The form release agent shall be VOC compliant.
- I. Inserts: Metal inserts for the anchorage of materials or equipment to concrete construction, not supplied by other trades and required for work.
  - 1. Adjustable wedge inserts of malleable cast iron, complete with bolts, nuts, and washers; 3/4 inches bolt size unless otherwise indicated.
  - 2. Threaded inserts of malleable cast iron furnished complete with full depth bolts; 3/4 inch bolt size, unless otherwise indicated.
  - 3. Sheet metal reglets formed of the same type and gauge as flashing metal are to be built into reglets unless otherwise indicated. Fill the reglet or cover the face opening to prevent intrusion of concrete or debris.
- J. Fillets for chamfered corners: wood strips 3/4 inch by 3/4 inch; maximum possible lengths.

## **2.2 DESIGN OF FORMWORK**

- A. Design, erect, support, brace and maintain formwork so that it will safely support vertical and lateral loads until such loads can be supported by the concrete structure.
  - 1. Carry vertical and lateral loads to the ground by formwork system and in-place construction that has attained adequate strength.
  - 2. Design forms and falsework to include assumed values of live load, dead load, the weight of moving equipment operated on formwork, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to the safety of the structure during construction.
  - 3. Design formwork to be removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.
- B. Fabricate formwork to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material as required to prevent leakage and fins.

## **PART 3 EXECUTION**

### **3.1 FORM CONSTRUCTION**

- A. General:
  - 1. Construct forms to sizes, shapes, lines, and dimensions shown and required to obtain the accurate location, grades, level, and plumb work. Construct and erect forms in accordance with ACI 301 and ACI 347.
  - 2. Provide for openings, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required.
  - 3. Select materials to obtain the required finishes.
  
- B. Fabricate forms for easy removal without hammering or prying against concrete surfaces.
  - 1. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
  - 2. Provide top forms for inclined surfaces where the slope is too steep to place concrete.
  - 3. Kerf wood inserts for forming keyways, reglets, and recesses, to prevent swelling and allow easy removal.
  
- C. Provide temporary openings where the interior area of formwork is inaccessible for cleanout, inspection before concrete placement, and placement of concrete.
  - 1. Brace temporary closures and set them tightly to forms to prevent loss of concrete mortar.
  - 2. Locate temporary openings on forms in as inconspicuous a location as possible.
  - 3. Form intersecting planes to provide true, clean-cut corners, with edge grain of plywood not exposed as a form for concrete.
  
- D. Falsework: Erect falsework and support, brace, and maintain to safely support loads applied until such loads can be supported by in-place concrete structures.
  
- E. Provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing, using wedges or jacks or a combination thereof. Provide trussed supports when adequate foundations for shores and struts cannot be secured.
  
- F. Support form-facing materials with structural members spaced to prevent deflection.
  - 1. Provide camber in formwork as required for anticipated deflections due to the weight and pressure of fresh concrete and construction loads for long-span members without intermediate supports.
  - 2. Inspect falsework and formwork during and after concrete placement to determine abnormal deflection or signs of failure; make necessary adjustments to produce work of the required dimension.
  
- G. Forms for Exposed Concrete:
  - 1. Drill forms to suit form ties used and to prevent leakage of concrete mortar around tie holes. Arrange form ties in a symmetrical and uniform pattern. Do not splinter forms by driving ties through improperly prepared holes.
  - 2. Do not use metal cover plates for patching holes or defects in forms.
  - 3. Provide sharp, clean corners at intersecting planes without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.
  - 4. Use extra studs, walers, and bracing to prevent bowing of forms between studs.
  - 5. Assemble forms so they may be readily removed without damage to exposed concrete surfaces.
  - 6. Form molding shapes, recesses, and projections with smooth finish materials, and install them in forms with sealed joints to prevent displacement.
  
- H. Corner Treatment: Form exposed corners of beams and columns to produce square, smooth, solid, unbroken lines, except as otherwise indicated.
  - 1. Form chamfers with 3/4 inch x 3/4 inch strips, unless otherwise indicated, accurately formed and surfaced to produce uniformly straight lines and tight edge joints. Extend

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

2. Unexposed corners may be formed either square or chamfered.
- I. Control joints are specified in Section 03 30 00, "Cast In Place Concrete."
  - J. Provisions for Other Work:
    1. Provide openings in formwork to accommodate the work of other Sections, including those under a separate contract (if any).
    2. Size and location of openings, recesses, and chases are the responsibility of the Section requiring such items.
    3. Accurately place and securely support items to be built into forms.
  - K. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces. Remove chips, wood, sawdust, dirt, and other debris just before the concrete is placed.

### **3.2 FORM COATINGS**

- A. Coat the form contact surfaces with a form release agent before reinforcement is placed.
  1. Do not allow excess material to accumulate in forms or to come into contact with reinforcement or surfaces that will be bonded to fresh concrete.
  2. Apply in compliance with the manufacturer's instructions.
- B. Coat steel forms with non-staining, rust preventative release agent or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

### **3.3 INSTALLATION OF EMBEDDED ITEMS**

- A. General:
  1. Set and built into work, anchorage devices, anchor bolts, and other embedded items attached to, or supported by, cast-in-place concrete.
  2. Use setting drawings, diagrams, templates, instructions, and directions furnished by suppliers of items to be embedded or attached.
- B. Edge Forms and Screed Strips:
  1. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours.
  2. Provide and secure units to support types of screeds required.

### **3.4 REMOVAL OF FORMS**

- A. General:
  1. Formwork not supporting concrete, such as sides of beams, walls, columns, and similar items, may be removed after curing at not less than 50 deg. F for 24 hours after placing concrete, provided the concrete is sufficiently hard not to be damaged by form removal operations and curing and protection operations are maintained.
  2. Formwork supporting the weight of concrete, such as beam, slab, or joist soffits, and other structural elements may not be removed until the concrete has attained seventy-five percent (75%) of the specified minimum 28-day compressive strength.
  3. Determine the potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members, as specified in Section 03 30 00.
  4. Form-facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal without loosening or disturbing shores and supports.

**3.5 REUSE OF FORMS**

- A. Clean and repair surfaces of forms to be reused in work.
  - 1. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable.
  - 2. Apply new form release agent material to concrete contact surfaces as specified for new formwork.
  
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints.
  - 1. Align and secure joints to avoid offsets.
  - 2. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Architect.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 DESCRIPTION**

- A. This Section describes the requirements for providing accessories for concrete, including drilled-in anchors, safety treads, and water stops.

**1.2 RELATED WORK**

- A. Division 1 – General Requirements
- B. Division 3 - Concrete

**1.3 REFERENCES**

- A. ASTM A36 – Structural Steel.
- B. ASTM A193-B7 – High Strength Structural Steel.
- C. ASTM A307 – Carbon Steel Bolts and Studs.
- D. ASTM A615 – Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- E. ASTM B633 – Electrodeposited Coatings of Zinc on Iron and Steel.
- F. ASTM B695 – Coatings of Zinc Mechanically Deposited on Iron and Steel.
- G. ASTM C881 – Epoxy-Resin-Based Bonding Systems for Concrete.
- H. ASTM E488 – Strength of Anchors in Concrete and Masonry Elements.
- I. ASTM E1512 – Testing Bond Performance of Adhesive-Bonded Anchors.
- J. ASTM F593 – Stainless Steel Bolts, Hex Cap Screws, and Studs.
- K. ACI 318 – Building Code Requirements for Structural Concrete.
- L. ACI 355.2 – Standard for Evaluating the Performance of Post-Installed Mechanical Anchors in Concrete.
- M. ACI 355.4 – Qualification of Post-Installed Adhesive Anchors in Concrete.
- N. ICC AC01 – Acceptance Criteria for Expansion Anchors in Concrete and Masonry Elements.
- O. ICC AC58 – Acceptance Criteria for Adhesive Anchors in Masonry Elements.
- P. ICC AC60 – Acceptance Criteria for Unreinforced Masonry Anchors.
- Q. ICC AC70 – Acceptance Criteria for Powder Driver Fasteners in Concrete, Steel, and Masonry Elements.
- R. ICC AC106 – Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Concrete or Masonry.

- S. ICC AC193 – Acceptance Criteria for Mechanical Anchors in Concrete Elements.
- T. ICC AC308 – Acceptance Criteria for Post-installed Adhesive Anchors in Concrete Elements.
- U. Federal Specifications A-A-1922A, A-A-1923A, A-A-55614 for Expansion and Shield-Type Anchors.

#### **1.4 SUBMITTALS**

All submittals shall be made under Division 1 – General Requirements provisions.

#### **1.5 QUALITY ASSURANCE**

- A. Perform work in accordance with the California Building Code.
- B. Obtain materials from the same source throughout the work.
- C. Anchors should be listed as ICC or IAPMO approved for the material being installed in.

#### **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to the site in the manufacturer's packaging, undamaged and with installation instructions.
- B. Store materials to prevent damage or deterioration.

### **PART 2 PRODUCTS**

#### **2.1 MATERIALS**

- A. Waterstops: Rubber flat, dumbbell type, or center bulb type at construction joints and other joints where indicated, size to suit joints.
- B. Safety Treads at stairs: Provide Wooster Products Inc. extruded aluminum base with abrasive filler safety treads: Type WP24A Spectra Safety Treads at concrete-filled metal pan stair treads and Type WP231BF Supergrit Safety Treads at cast-in-place concrete stairs.
- C. Drilled-In Anchors: Acceptable manufacturers for the following products include, but are not limited to, Simpson Anchor Systems, Hilti, and Powers. Verify with the manufacturer's installation instructions and specifications for more information, including hollow substrate requirements, moisture of concrete, hole size, and type of bit used to drill holes.
  - 1. Expansion Anchors:
    - a. Cracked Concrete Wedge Anchors: Anchors shall be designed in accordance with ACI 318 Chapter 17, which requires anchors to be evaluated per ACI 355.2. The anchors shall also be tested in accordance with AC 193 for all mandatory and optional tests, specifically seismic and wind testing.
    - b. Wedge Anchors: Anchors shall meet the physical requirements of Federal Specification A-A-1923A, Type 4. Anchors shall have an ICC or IAPMO evaluation report and be tested per AC 01 for seismic and wind loading, combined shear and tension loads, and critical and minimum edge distance. Anchor materials include carbon steel (zinc plated or mechanically galvanized), Type 304 or 316 stainless steel complying with ASTM A493, or Type 303 stainless free-machine steel complying with ASTM A582.



- c. Sleeve Anchors: Anchors shall meet the physical requirements of Federal Specification A-A-1922A. Anchors shall have an ICC or IAPMO evaluation report and be tested per AC 01 for static loading and critical and minimum edge distance and spacing. Anchor materials include carbon steel with an electroplated zinc finish and Type 304 stainless steel complying with ASTM A493.
  - d. Flush-Mount, Internally Threaded Shell Anchors: Anchors shall meet the physical requirements of Federal Specification A-A-55614, Type I. Anchors shall have an ICC or IAPMO evaluation report and be tested per AC 01 for seismic and wind loading, combined shear and tension loads, and critical and minimum edge distance and spacing. Anchor materials include carbon steel with an electroplated zinc finish, Type 316 stainless steel complying with ASTM A493, or Type 303 stainless free-machine steel complying with ASTM A582.
2. Adhesive Anchors: Adhesive anchors shall consist of an insert and an adhesive formula. Inserts shall meet the requirements of ASTM A307, A36, A193-B7, or F1554 for threaded rods or ASTM A615 or A706 for reinforcing steel. For exterior conditions, the threaded insert shall be galvanized per ASTM A153 or be a 300 series stainless steel with nuts and washers of the same material. Use an adhesive material meeting one of the following criteria.
- a. Epoxy Adhesives: Adhesives shall be a cartridge-type, two-component, solid epoxy-based system dispensed and mixed through a static mixing nozzle supplied by the manufacturer. Anchors shall meet the minimum requirements of ASTM C881, have an ICC or IAPMO evaluation report, and be tested per AC 308 for seismic and wind loading, long-term creep at elevated temperatures, static loading at elevated temperatures, damp and water-filled holes, freeze-thaw conditions, and critical and minimum edge distance and spacing. Installation temperatures shall be verified with the manufacturer's instructions.
  - b. Acrylics Adhesives: Adhesive shall be a cartridge type, two-component, acrylic-based system dispensed and mixed through a static mixing nozzle supplied by the manufacturer. Anchors shall meet the minimum requirements of ASTM C881, have an ICC or IAPMO evaluation report, and be tested per AC 308 for seismic and wind loading, long-term creep at elevated temperatures, static loading at elevated temperatures, damp and water-filled holes, freeze-thaw conditions, and critical and minimum edge distance and spacing. Installation temperatures shall be verified with the manufacturer's instructions.
  - c. Encapsulated Adhesives: Capsule shall be a two-component, vinylester-based adhesive capsule-within-a-capsule system supplied in a manufacturer's standard packaging. Capsule adhesive shall be tested per AC 308 for a long-term creep at elevated temperatures and critical and minimum edge distance and spacing. Installation temperatures shall be verified with the manufacturer's instructions.
3. Concrete Screw Anchors:
- a. Self-Tapping Concrete Screw Anchors: Anchors shall have 360-degree contact with the concrete surface and shall not require oversized or undersized holes for installation. Fastener material shall be steel complying with AISI 10B21 or 15B21, heat-treated and zinc-plated, or mechanically galvanized. Anchors shall have an ICC or IAPMO report and be tested in accordance with AC 106 for static tension, shear loading, and critical and minimum edge distance and spacing.
4. Powder Actuated Fasteners:
- a. Fasteners shall be of drive pin and threaded stud types and be manufactured from AISI 1060 to 1065 steel with an electroplated zinc finish. The minimum yield strength shall be 90,000 psi.
  - b. Fasteners shall not be used where spalling of the concrete will occur. If spalling does occur, patch as required per Section 03 01 00.

### **PART 3 EXECUTION**

**3.1 INSTALLATION**

- A. Water Stops: Provide water stops in construction joints as indicated.
  - 1. Install water stops to form a continuous diaphragm in each joint.
  - 2. Make provisions to support and protect water stops during the progress of work.
  - 3. Fabricate field joints in water stops per the manufacturer's printed instructions.
  
- B. Safety Treads at stairs:
  - 1. Install all safety treads per the manufacturer's instructions with the appropriate tools in the correct locations.
  
- C. Anchors:
  - 1. Install all anchors per the manufacturer's instructions with the appropriate tools.
  - 2. Where holes are drilled for anchors, holes shall be accurately and squarely drilled and cleaned per the manufacturer's instructions.
  - 3. The contractor shall arrange for a manufacturer's field representative to provide installation training for all products to be used before the commencement of work. Only trained installers shall perform post-installed anchor installation. A record of training shall be kept on-site and made available to the EOR/ IOR as requested.
  - 4. Adhesive anchors installed in horizontal to vertical overhead orientation to support sustained tension loads shall be done by a certified adhesive anchor installer (AAI) as certified through ACI/CRSI (ACI 318 Chapter 17). Proof of current certification kept on site and made available to the EOR/ IOR as requested.
  - 5. Adhesive anchors must be installed in concrete aged a minimum of 21 days (ACI 318 Chapter 17). For installations sooner than 21 days, consult the adhesive manufacturer.

**3.2 FIELD QUALITY CONTROL**

- A. Provide continuous inspection of the installation of all anchors per CBC Table 1705.3.
  
- B. Torque test anchors per the requirements of the CBC Table 1705.3, ACI 318 Chapter 17, and the tables provided on Special Inspection Notes sheet. Torque testing of adhesive anchors is not permitted.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 WORK INCLUDED**

- A. Forming integral contraction and control joints in concrete.
- B. Visually concealing expansion joints in concrete.

**1.2 WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS**

- A. Furnish only integral joint fillers; see Section 03 11 13 for installation.

**1.3 RELATED WORK**

- A. Division 1 – General Requirements.
- B. Division 3 - Concrete.
- C. Division 7 – Thermal and Moisture Protection.

**1.4 REFERENCES**

- A. ASTM D994 - Preformed Expansion Joint Filler for Concrete (Bituminous Type).
- B. ASTM D1751 – Pre-formed Expansion Joint Fillers for Concrete Paving and Structural Construction.

**1.5 SUBMITTALS**

All submittals shall be submitted under Division 1 – General Requirements provisions.

- A. Product Data.
- B. Shop Drawings: Not required.
- C. Samples for Verification:
  - 1. Provide 24-inch long contraction and control joint samples under provisions of Section 01 33 00.
- D. Manufacturer's Installation Instructions:
  - 1. Submit the manufacturer's installation instructions.
- E. Joint Layouts:
  - 1. Submit the proposed construction and control joint layout to Architect seven (7) days before forming concrete.

**PART 2 PRODUCTS**

**2.1 ACCEPTABLE MANUFACTURERS - INTEGRAL JOINT MATERIALS**

- A. Burke

- B. Substitutions: Under provisions of Division 1 – General Requirements.

## **2.2 INTEGRAL JOINT MATERIALS**

- A. Formed Construction Joints: Minimum 26 gage thick galvanized steel; tongue and groove type profile, with removable top strip exposing sealant trough; knockout holes at 6 inches on center to receive doweling; with anchors.
- B. Joint Filler (Fiberboard): ANSI/ASTM D994, bituminous impregnated fiberboard; of sizes detailed.

## **2.3 SEALANTS**

- A. Sealant and Primer: Specified in Section 07 92 00.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- A. Construction Joints: Locate and install construction joints as indicated or if not indicated so as not to impair the strength and appearance of the structure, as approved by Architect.
  - 1. Provide keyways at least 1 1/2 inches deep in construction joints in walls and slabs.
  - 2. Place construction joints perpendicular to the main reinforcement. Continue reinforcement across construction joints.
- B. Waterstops: Provide water stops in construction joints as indicated.
  - 1. Install water stops to form a continuous diaphragm in each joint.
  - 2. Make provisions to support and protect water stops during the progress of work.
  - 3. Fabricate field joints in water stops per the manufacturer's printed instructions.
- C. Isolation Joints in Slabs on Grade: Provide at contact points between slabs on grade and columns.
- D. Control Joints in Slabs on Grade: Provide control joints in slabs on grade to form panels or patterns as indicated. Use inserts 1/8 to 1/4 inch wide x 1/4 of slab depth unless otherwise indicated.
  - 1. Form control joints by inserting pre-molded plastic, hardboard, or fiberboard strip into fresh concrete until the top surface of the strip is flush with the slab surface. Tool slab edges round on each side of the insert.
  - 2. After the concrete has cured, remove the inserts and clean the groove of loose debris.
  - 3. Control joints may be produced by saw cuts 1 inch deep, using powered cutters immediately after the concrete has cured sufficiently to carry the machine weight.
  - 4. Unless otherwise indicated, joint spacing in slabs on grade shall be 24 to 36 times slab thickness.
- E. Epoxy Joint Filler: Interior joints in areas receiving a metallic or mineral aggregate hardener shall be filled with specified epoxy filler. The joint filler shall be mixed and installed per the manufacturer's instructions. Joints shall not be filled until at least 90-days after slab placement.
- F. Locate the fiberboard concrete control joint where indicated on the Drawings.
- G. Place formed construction joints in the floor slab pattern placement sequence. Set the top screed to the required elevations. Secure to resist movement of wet concrete.

- H. Install joint fillers and sealants per the manufacturer's instructions.
- I. Apply sealants per Section 07 92 00.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 DESCRIPTION**

- A. This Section describes the requirements for providing concrete reinforcement for:
  - 1. Reinforcing steel bars, welded steel wire fabric for cast-in-place concrete
  - 2. Support chairs, bolsters, and bar supports for supporting reinforcement

**1.2 RELATED WORK**

- A. Division 1 – General Requirements
- B. Division 3 - Concrete

**1.3 REFERENCES**

- A. ACI 318 – Specifications for Structural Concrete
- B. ACI 315 – Details and Detailing of Concrete Reinforcement
- C. AWS D1.4 – Structural Welding Code Reinforcing Steel
- D. ASTM A615 – Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
- E. CBC, Chapter 19
- F. CRSI Manual of Standard Practice
- G. ASTM A706 – Low Alloy Deformed and Plain Bars for Concrete Reinforcement.

**1.4 SUBMITTALS**

- A. Product Data.
- B. Shop Drawings:
  - 1. Comply with ACI 315
  - 2. Indicate sizes, spacing, locations, and quantities of reinforcing steel, bending, and cutting schedules, splice locations, stirrup and tie spacing, and supporting and spacing devices.
- C. Samples: Not required.
- D. Mill Certificates:
  - 1. Steel producer's certificates of mill analysis, tensile and bend tests for reinforcing steel.

**1.5 QUALITY ASSURANCE**

- A. Reinforcement work shall comply with ACI 318 and ACI 315.
- B. Welding procedures, welding operators, and welders shall be qualified in accordance with AWS D1.4. Welders whose work fails to pass inspection shall be re-qualified before proceeding with further welding.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver reinforcement to the Project site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on shop drawings.
- B. Store materials to prevent damage and accumulation of dirt or excessive rust.

**PART 2 PRODUCTS**

**2.1 MATERIALS**

- A. Reinforcing Bars: ASTM A615, deformed, Grade 60
- B. Bars for Welded Splices: ASTM A706, low alloy steel
- C. Steel Wire: ASTM A82-02; 16 gauge minimum
- D. Deformed Wire: ASTM A496
- E. Welded Smooth Wire Fabric: ASTM A185
- F. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place
  - 1. Use wire bar type supports complying with CRSI recommendations unless otherwise indicated. Do not use wood, brick, and other unacceptable materials.
  - 2. Use supports with sand plates or horizontal runners where base material will not support chair legs for slabs on grade.
  - 3. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with:
    - a. Plastic-protected legs (CRSI, Class 1)
    - b. Stainless steel protected legs (CRSI, Class 2)
    - c. Either plastic-protected or stainless steel-protected legs, at the Contractor's option.

**2.2 FABRICATION**

- A. General:
  - 1. Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with ACI 315 and CRSI "Manual of Standard Practice."
  - 2. Do not re-bend or straighten reinforcing.
  - 3. Unacceptable Materials: Reinforcement with one of the following defects will not be permitted in the work:
    - a. Bar lengths, depths, and bends exceeding CRSI fabrication tolerances
    - b. Bends or kinks not indicated
    - c. Bars with a reduced cross-section

**2.3 SOURCE QUALITY CONTROL**

- A. The Owner's Testing Laboratory will collect mill test reports for reinforcement.

**PART 3 EXECUTION**

**3.1 INSTALLATION**

- A. Comply with referenced codes and standards.
- B. Clean the reinforcement to remove loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. As required, locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers.
- D. Place reinforcement to obtain minimum coverage for concrete protection.
- E. Ensure bar spacing meets the requirements of ACI 318, except that the clear distance between bars shall be 1-1/2-inches minimum.
- F. Arrange, space, and securely tie bars and bar supports with 16 gauge wire to hold reinforcement in position during concrete placement operations. Set wire ties so twisted ends are directed away from exposed concrete surfaces.
- G. Provide sufficient numbers of supports of strength to carry reinforcing.
  - 1. Do not place reinforcing bars more than 2-inches beyond the last leg of continuous bar supports.
  - 2. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
- H. Splices: Splice bars by lapping ends and tightly wire tying. Comply with the requirements of ACI 318 for the minimum lap of spliced bars.
- I. Welding:
  - 1. Comply with the requirements of AWS D1.4 for field welding.
  - 2. Before field welding, determine the weldability of reinforcing bars by laboratory chemical analysis of steel.
  - 3. Only steel conforming to chemical requirements specified in AWS D12.1 may be welded.
  - 4. Inspection and Test of Welds: All inspections and testing of welds shall be conducted per the General Structural Notes, by the Building Official, and the CBC.
- J. The Architect shall be notified 48 hours before pouring concrete for form and steel placement observation.

**END OF SECTION**



**PART 1 GENERAL**

**1.1 DESCRIPTION**

- A. This Section describes the requirements for providing cast-in-place concrete.

**1.2 RELATED WORK**

- A. Division 1 – General Requirements
- B. Division 3 - Concrete

**1.3 REFERENCES**

- A. ACI 301 – Specifications for Structural Concrete Buildings
- B. ASTM C33 – Concrete Aggregates
- C. ASTM C94 – Specifications for Ready-Mixed Concrete
- D. ASTM C150 – Portland Cement
- E. CBC Chapter 19
- F. ASTM C309 – Liquid Membrane – forming compounds for curing concrete
- G. ACI 614 – Recommended Practice for Measuring, Mixing, and Placing Concrete
- H. ASTM C31 – Making and Curing Concrete Test Specimens in the Field
- I. ASTM C39 – Test Method for Compressive Strength of Cylindrical Concrete Specimens
- J. ACI 318 – Building Code Requirements for Structural Concrete
- K. ACI 305 – Hot Weather Concreting
- L. ACI 306 – Cold Weather Concreting

**1.4 SUBMITTALS**

All submittals shall be submitted under Division 1 – General Requirements provisions.

- A. Mix Designs:
  - 1. Provide a mix design for each class of concrete specified.
- B. Laboratory Test Reports:
  - 1. Laboratory test reports for concrete.
- C. Material Certificates:
  - 1. Furnish materials certificates instead of laboratory test reports when permitted by the Architect. Material producers and Contractors certifying that each material item complies with or exceeds specified requirements should sign material certificates.

- D. Delivery Tickets:
  - 1. Furnish copies of delivery tickets for each load of concrete delivered to the site to the Project Inspector. Provide the information specified.

## **1.5 QUALITY ASSURANCE**

- A. Perform Work per ACI 301 and the California Building Code.
- B. Obtain materials from the same source throughout the Work.
- C. Concrete Testing:
  - 1. Owner shall employ a testing laboratory experienced in design and testing concrete materials and mixes to perform material evaluation tests.
  - 2. As directed by Architect, materials and installed work may require testing and retesting during work progress.
    - a. Allow access to material stockpiles and facilities.
    - b. Owner shall pay for testing. Retesting concrete that replaces previously rejected concrete and core testing required to establish the adequacy of in-place concrete shall be done at the Contractor's expense.
    - c. All tests as required by ACI 318 Chapter 26 and as outlined in the General Structural Notes of the construction drawing set, by the Building Official and the CBC.
- D. Colored Concrete Mock-up
  - 1. In consultation with the Owner, select a small isolated area of the slab, such as an electrical closet) for mock-up.
  - 2. Apply colored surface hardener in the mock-up area using the same equipment and installation procedure planned for the balance of the Project.
  - 3. If the Architect accepts, the mock-up may be incorporated into the work and become the production standard for the balance of the Project.

## **PART 2 PRODUCTS**

### **2.1 CONCRETE MATERIALS**

- A. Portland Cement: ASTM C150, Type II gray color unless otherwise approved. Use only one brand of cement for each required type throughout Project unless otherwise approved by Architect.
- B. Normal Weight Aggregates: ASTM C33.
- C. Water: Clean, fresh, and not detrimental to concrete.
- D. Admixtures: Use in compliance with the manufacturer's printed instructions. Do not use admixtures that have not been incorporated and tested in accepted mixes unless approved by Architect.
  - 1. Water Reducing Admixture: Conforming with ASTM C494.
  - 2. Water Reducing, Retarding Admixture: ASTM C494.
  - 3. Mid Range Water Reducing Admixture: ASTM C494, Type A.
  - 4. High-Range Water Reducing Admixture: ASTM C494, Type F or G.
  - 5. Air Entraining Admixture: ASTM C260.
  - 6. Non-Corrosive, Non-Chloride Accelerator: ASTM C494, Type C or E.
  - 7. Prohibited Admixtures: Calcium chloride, thiocyanates, or admixtures containing more than 0.05-percent chloride ions are not permitted.

**2.2 PROPORTIONING AND DESIGN OF MIXES**

- A. Where the concrete production facility can establish the uniformity of its production for concrete of similar strength and materials based on recent test data, the average strength used as a basis for determining mix design proportions shall exceed the specified design strength by the requirements of ACI 318 or ACI 301
- B. When a concrete production facility does not have field test records for calculation of standard deviation, the required average strength used as the basis for determining mix design proportions shall be at least 1000 psi greater than the specified concrete strength of less than 3000 psi concrete and 1200 psi greater than the specified compressive strength of 3000 psi or greater concrete.
- C. Mix design submission shall be accompanied by complete standard deviation analysis or trial mixture test data.
- D. Submit written reports to the Architect of each proposed mix for each type of concrete at least 15 days before the start of work. Do not begin concrete production until mixes have been reviewed and accepted.
- E. Admixtures:
  - 1. Concrete shall contain the specified water-reducing or water-reducing retarding admixture and/or high-range water-reducing admixture. Concrete required to be air-entrained shall contain an approved air-retraining admixture. Pumped concrete, concrete for industrial slabs, fiber concrete, architectural concrete, concrete required to be watertight, and concrete with a water-cement ratio below 0.50 shall contain the specified high-range water-reducing admixture.
  - 2. Use air-entraining admixture in exterior concrete unless otherwise indicated. Add at the manufacturer's prescribed rate to produce concrete at the point of placement with the specified air content.

**F. Concrete Types: Concrete Strengths (all normal weight)**

LOCATION	28-DAY COMPRESSIVE STRENGTH (f'c)	MAX WATER CEMENT RATIO	AIR CONTENT
Footings, walls, drilled piers, grade beams, retaining walls, & other below grade concrete.	3000 psi	.50	0-2%
Exterior slabs on grade	2500 psi	.50	0-2%
Interior slabs on grade	2500 psi	.50	0-2%

- G. Slump Limits: Concrete containing the high-range water-reducing admixture shall have a maximum slump of 9-inches unless approved by the Architect. The concrete shall arrive at the Project site at a slump of 2- to 3-inches, be verified, then the high-range water-reducing admixture added to increase the slump to the approved level. All other concrete shall have a maximum slump of 4 inches for slabs and 5 inches for other members unless concrete contains a mid-range water-reducing admixture.
- H. Chloride ion content of aggregates of constituents shall be tested by the laboratory when directed by the Architect. The total chloride ion content of the mix, including all constituents, shall not exceed 0.06-percent, or 0.10-percent, or 0.15-percent chloride ions by weight of cement.

**2.3 SOURCE QUALITY CONTROL**

- A. The Owner's Testing Laboratory will provide source quality control as outlined in the General

Structural Notes of the construction drawing set.

### **PART 3 EXECUTION**

#### **3.1 PREPARATION**

- A. Pre-placement Inspection:
  - 1. Before placing concrete, inspect formwork, reinforcing steel, and items to be embedded or cast in as outlined in the General Structural Notes of the construction drawing set.
  - 2. Moisten wood forms immediately before placing concrete where form coatings are not used.
  - 3. Soil at the bottom of foundation systems is subject to testing for soil-bearing value by the testing laboratory as specified in Section 31 00 00, "Earthwork." Place concrete immediately after approval of excavations.
  - 4. Coordinate the installation of joint materials and moisture barriers with the placement of forms and reinforcing steel.
- B. Moisture Barrier Material: Where concrete slabs are indicated to be placed over moisture barrier; spread moisture barrier over subbase with edges and ends lapped 6 inches and sealed.

#### **3.2 CONCRETE MIXING**

- A. Measurement: Materials for concrete shall be measured by weighing the aggregates and cement using suitable equipment designed and constructed for this purpose. Each size of aggregate and the cement shall be weighed separately. The accuracy of measuring devices shall be such that quantities are measured to within the following percentages of the desired amount: 1 percent for cement and water, 2 percent for aggregates, and 3 percent for admixtures. Mixing water and admixtures shall be measured by volume.
- B. Mixing: All concrete shall be transit mixed. Deposit the concrete into the final position within one hour of the introduction of mixing water.

#### **3.3 CONCRETE PLACEMENT**

- A. Notify the Architect a minimum of 48 hours before the commencement of concreting procedures.
- B. Placing Record: Record time and date of casting concrete in building units; maintain record open to inspection by the Architect.
- C. General: Place concrete in compliance with ACI 301, ACI 614, and ACI 318.
  - 1. Deposit concrete continuously or in layers so that concrete will not be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. Provide construction joints as specified if a section cannot be placed continuously. Deposit concrete as nearly as possible to its final location to avoid segregation.
  - 2. Concrete shall not be placed until the Architect inspects and approves reinforcement, pipes, conduits, or other set-in items. Concrete shall not be placed on soft or water-soaked ground, in water, on frozen ground, or surfaces that are covered by frost. Wood forms shall be thoroughly wetted before concrete is placed.
  - 3. Screed concrete to receive other construction to the proper level to avoid excessive skimming or grouting.
  - 4. Do not use concrete that becomes non-plastic and unworkable, does not meet required quality control limits, or has been contaminated by foreign materials.

5. Do not re-temper concrete.
  6. Remove rejected concrete from the Project site.
- D. Concrete Conveying: Handle concrete from the point of delivery and transfer to concrete conveying equipment and to locations of final deposit as rapidly as possible by preventing segregation and loss of mixed materials.
1. Provide mechanical equipment for conveying concrete to ensure continuous flow at the delivery end.
  2. Provide runways for wheeled concrete conveying equipment from the delivery point to locations of final deposit.
  3. Keep interior surfaces of conveying equipment, including chutes, free of hardened concrete, debris, water, snow, ice, and other deleterious materials.
  4. Maximum height of fall of concrete shall be 4' 0", except when tremies, tubes, or elephant trunks are used. Concrete mix with a temperature above 80 degrees F will not be accepted.
- E. Placing Concrete into Forms:
1. Deposit in forms in horizontal layers not deeper than 24 inches in a manner to avoid inclined construction joints.
  2. Where placement consists of several layers; place each layer while the preceding layer is still plastic to avoid cold joints.
  3. Remove temporary spreaders in forms when concrete placing has reached elevations of spreaders.
  4. Consolidate concrete with mechanical vibrating equipment supplemented by hand spading, rodding, or tamping. Do not vibrate forms and reinforcing.
  5. Do not use vibrators to transport concrete inside forms.
    - a. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine.
    - b. Place vibrators to rapidly penetrate at least 6 inches into the preceding layer.
    - c. Do not insert vibrators into lower layers of concrete that have begun to set.
    - d. At each insertion, limit vibration duration to the time necessary to consolidate concrete and complete embedment of reinforcement and other items without causing segregation of mix.
- F. Placing Concrete Slabs:
1. Deposit and consolidate concrete slabs in continuous operation within the limits of construction joints until the panel or Section is completed.
  2. Separate the exterior slabs on grade from vertical surfaces with joint filler. Extend the joint filler from the bottom of the slab to within 1/2 inch of the finished slab surface.
  3. There shall be no variations in the concrete slab that exceed 1/8" in a 10' radius. (USE FOR WOOD SPORTS FLOORING)
- G. Consolidate concrete during placing operations using mechanical vibrating equipment so that concrete is thoroughly worked around reinforcement, other embedded items, and corners.
- H. Bring slab surfaces to the correct level with a straightedge and strike off.
1. Use bull floats or darbies to smooth the surface, leaving it free of humps or hollows.
  2. Do not disturb the slab surface before beginning the finishing operations.
- I. Maintain reinforcing steel in proper position during concrete placement operations.
- J. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify the Architect/Engineer upon discovery.

- K. Use of additional water in mixing the concrete to promote free flow in chutes of low inclination or any other reason will not be allowed.
- L. In case of rain or inclement weather, freshly poured concrete shall be protected against infiltration of external water. Placing shall be terminated against the nearest construction joint bulkhead and covered at once with tarpaulins or similar waterproof protection until the concrete has set.

### **3.4 FINISH ON FORMED SURFACES**

- A. Rough Form Finish: Provide as cast rough form finishes to formed concrete surfaces concealed in finish work or by other construction unless otherwise indicated.
  - 1. Standard rough form finish shall be the texture imparted by the form-facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. Smooth Form Finish: Provide a cast smooth form finish for formed surfaces exposed to view or that are covered with a coating material applied directly to concrete or a covering material bonded to concrete such as waterproofing, damp proofing, painting, or similar system.
  - 1. Produce smooth form finish by selecting form material to impart a smooth, hard, uniform texture and arranging them orderly and symmetrically with minimum seams.
  - 2. Repair and patch defective areas; remove and smooth fins and other projections.

### **3.5 CONCRETE SURFACE REPAIRS**

- A. Patch defective areas with specified proprietary patching mortar or cement mortar immediately after the removal of forms when directed by Architect.
  - 1. Cut out honeycomb, rock pockets, voids over 1/4 inch, and holes left by tie rods and bolts down to solid concrete.
    - a. Make edges of cuts perpendicular to the concrete surface.
    - b. Before placing patching mortar, clean, dampen with water, and brush coat the area to be patched with a bonding agent.
  - 2. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that when dry, patching mortar will match the color of the surrounding concrete.
    - a. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching.
    - b. Compact mortar in place and strike off slightly higher than the surrounding surface.
- B. Repair of Formed Surfaces: Repair exposed to view formed concrete surfaces that contain defects impacting finish appearance.
  - 1. Remove and replace concrete with defective surfaces if defects cannot be repaired to the satisfaction of the Architect.
  - 2. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on the surface; and stains and other discolorations that cannot be removed by cleaning.
  - 3. Flush out form tie holes, fill with dry pack mortar, or precast cement plugs secured in place with a bonding agent.
  - 4. Repair concealed formed concrete surfaces containing defects that adversely affect the durability of concrete. Remove and replace concrete with defective surfaces if defects cannot be repaired.
- C. Repair of Unformed Surfaces: Test unformed surfaces for smoothness and to verify surface plane to specified tolerances. Correct low and high areas as specified.
  - 1. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness,

- using a template having the required slope - correct high and low areas as specified.
2. Repair finished unformed surfaces containing defects affecting the durability of concrete. Surface defects include cracks over 0.01 inch wide or penetrating to reinforcement or completely through non-reinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other conditions.
  3. Correct high areas by grinding after the concrete has cured for at least 14 days.
  4. Correct the low areas during or immediately after the completion of surface finishing operations by cutting out the low area and replacing it with fresh concrete.
  5. Repair defective areas, except random cracks and single holes not exceeding 1-inch diameter, by cutting out and replacing them with fresh concrete.
    - a. Remove defective areas to sound concrete with clean, square cuts, and expose reinforcing steel with at least 3/4 inch clearance around it.
    - b. Dampen concrete surfaces in contact with patching concrete and apply bonding compound.
    - c. Mix patching concrete to produce concrete of the same type or class as the original adjacent concrete.
    - d. Place, compact, and finish as required to blend with adjacent finished concrete.
    - e. Cure in the same manner as adjacent concrete.
  6. Repair isolated random cracks and single holes not over 1 inch in diameter by dry pack method.
    - a. Groove the top of cracks, cut out holes to sound concrete, and remove dust, dirt, and loose particles.
    - b. Dampen cleaned concrete surfaces and brush them with a neat cement grout coating.
    - c. Mix dry pack, consisting of 1 part portland cement to 2 1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water required for handling and placing.
    - d. Place the dry pack after the bonding compound has dried.
    - e. Compact the dry pack mixture in place and finish to match adjacent concrete.
    - f. Keep patched areas moist for not less than 72 hours.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 DESCRIPTION**

- A. This Section describes the requirements for the curing of concrete.

**1.2 RELATED WORK**

- A. Division 1 – General Requirements
- B. Division 3 - Concrete

**1.3 REFERENCES**

- A. ACI 301 – Specifications for Structural Concrete Buildings
- B. ASTM C94 – Specifications for Ready-Mixed Concrete
- C. CBC Chapter 19
- D. ASTM C171 –Sheet Materials for Curing Concrete
- E. ASTM C309 – Liquid Membrane-Forming compounds for Curing Concrete
- F. ACI 318 – Building Code Requirements for Structural Concrete

**1.4 QUALITY ASSURANCE**

- A. Perform Work per ACI 301 and ACI 318 Chapter 5.
- B. Obtain materials from the same source throughout the Work.

**PART 2 PRODUCTS**

**2.1 MATERIALS**

- A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 ounces per sq. yd.
- B. Moisture Retaining Cover: Polyethylene film complying with ASTM C171.
- C. Curing Compound: VOC compliant, clear, with a drying time of 40-minutes, complying with ASTM C309, Type 1, Class B when applied at 200-square feet per gallon.

**PART 3 EXECUTION**

**3.1 CONCRETE CURING AND PROTECTION**

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Curing and Protection: Surfaces not in contact with forms.



1. Curing shall be by application of the specified curing and sealing compound or by application of waterproof sheet materials conforming to ASTM C171.
  2. Liquid membrane-forming curing and sealing compounds shall be applied per the manufacturer's recommendations and as specified.
  3. Application of sheet materials shall be as specified.
  4. Membrane curing compound used in floor slabs receiving applied finish flooring shall be guaranteed by the manufacturer, in writing, not to impair the bonding of adhesive.
  5. For slabs to receive terrazzo, bonded cementitious materials, epoxy or urethane coatings, liquid floor hardener, and waterproofing, use a curing treatment of moisture-retaining covers.
  6. Apply curing compound immediately after final finishing.
  7. For curing by waterproof sheet material, the concrete shall be continually moist-cured for a minimum of 7-days. The curing process shall begin immediately after the final finishing.
- C. Interior slabs and exterior slabs, sidewalks, and curbs shall be cured with clear curing and sealing compound. Maximum coverage shall be 400-sq. ft. per gal. on steel troweled surfaces and 300-sq. ft. per gal. on floated or broomed surfaces. The curing period shall be continuous for a minimum duration of 7-days when the ambient temperature exceeds 50-deg. F.
- D. Moisture Cover Curing:
1. Cover concrete surfaces with moisture-retaining cover conforming to ASTM C171 for curing concrete, placed in the widest possible width, with sides and ends lapped at least 3 inches and sealed by waterproofing tape or adhesive.
  2. Repair holes or tears during the curing period using cover material and waterproof tape.
- E. Liquid Membrane Curing:
1. Apply membrane-forming curing compound to damp concrete surfaces as soon as possible after the final finishing operations are complete, but no later than 2 hours.
  2. Apply uniformly in continuous operation by power spray or rollers per the manufacturer's directions.
  3. Recoat areas that are subjected to heavy rainfall within 3 hours after initial application.
  4. Maintain continuity of coating and repair damage during the curing period.
  5. Apply to horizontal surfaces when concrete is dry to touch with power spray or hair broom, per the manufacturer's directions.
  6. Apply to vertical surfaces within 24 hours after forms are stripped per the manufacturer's directions. Do not use where oil form coatings have been used.
- F. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs, and similar surfaces, by moist curing with forms in place for the entire curing period or until forms are removed. If forms are removed, continue curing by the methods specified above.
- G. Temperature of Concrete During Curing: When the atmospheric temperature is 40 deg. F and below, maintain a concrete temperature between 50 deg. F and 70 deg. F throughout the curing period.
1. When necessary, arrange for heating, covering, insulation, or housing required to maintain specified temperature and moisture conditions during the curing period.
  2. When concrete slab placements are subject to high temperatures, wind, and/or low humidity, the Architect may require the use of the evaporation retarder to minimize plastic cracking. The compound may be required to be applied one or more times during the finishing operations. The initial application shall be made after the strike-off operation.
  3. Protect concrete continuously during the curing period.

4. Maintain concrete temperature as uniformly as possible and protect from rapid atmospheric temperature changes. Avoid temperature changes in concrete that exceed 5 deg. F. in one hour, and 50 deg. F. in 24-hour periods.
5. Protect from Mechanical Injury: During the curing period, protect concrete from load stresses, heavy shock, excessive vibration, and damage caused by rain or flowing water. Protect finished concrete surfaces from damage by subsequent construction operations.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. This Section Includes:
  - 1. The requirements for furnishing and installing metal fabrications made from steel shapes, plates, bars, strips, tubes, pipes and castings not a part of structural steel or specified in other Sections.

**1.2 PERFORMANCE REQUIREMENTS:**

- A. Railings: Design, engineer, fabricate and install railings to withstand the following structural loads:
  - 1. Top Rail of Railing System: Capable of withstanding a concentrated load of 300-pounds applied at any point and a uniform load of 50-pounds per linear foot applied at any direction.
  - 2. Railings shall comply with California Building Code requirements.

**1.3 SUBMITTALS**

- A. Product Data: Manufacturer's specifications, anchor details and installation instructions, including paint products and grout.
- B. Shop Drawings: Include plans, elevations and details of metal fabrications and their connections. Show anchorage and accessory items.

**1.4 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Firm experienced in successfully producing metal fabrications similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the work.
- B. Welding Qualifications: Qualify welding processes and welding operators in accordance with AWS D1.1, D1.2, D1.3, and D1.8 as applicable. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved.

**1.5 PROJECT CONDITIONS**

- A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit, by accurate field measurements before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule to avoid delay of work.

**1.6 SEQUENCING AND SCHEDULING**

- A. Painting: Items specified in this Section as having a shop applied prime coat will be job painted as specified in Section 09 91 00, unless otherwise noted.
- B. Furnish templates for anchors and bolt installation by other Sections.

**PART 2 PRODUCTS**

**2.1 MATERIALS**

- A. General: For fabrication of metal work, which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
- B. Wide Flange Steel Shapes: ASTM A992
- C. Steel Plates, Shapes and Bars: ASTM A36
- D. Steel Tubing: Cold formed, ASTM A500; or hot rolled, ASTM A501
- E. Structural Steel Sheet: Hot rolled, ASTM A1011; or cold rolled ASTM A1008
- F. Galvanized Structural Steel Sheet: ASTM A653
- G. Steel Pipe: ASTM A53; type and grade selected by fabricator; black finish unless galvanizing is indicated or specified; standard weight, schedule 40, unless otherwise indicated.
- H. Gray Iron Castings: ASTM A48, Class 30
- I. Malleable Iron Castings: ASTM A47, grade selected by fabricator
- J. Brackets, Flanges and Anchors: Cast or formed metal of same type material and finish as supported rails, unless otherwise indicated
- K. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. Provide bolts, washers and shims as required, hot dip galvanized, ASTM A153.
- L. Fasteners: Steel fasteners, galvanized in accordance with ASTM A153, selected by fabricator
- M. Paint:
  - 1. Metal Primer: SSPC 20, Type 2
    - a. Exterior Exposure: Tnemec 90-97 Tnemec Zinc or Architect approved substitute.
    - b. Interior Exposure: Tnemec 18 Enviro-Prime acrylic emulsion rust-inhibitive primer or Architect approved substitute.
    - c. Exposed to view items to be field painted shall be primed with a primer compatible with final finish coats specified in Section 09 91 00.
  - 2. Galvanizing Repair Paint: High zinc dust content paint for re-galvanizing welds in galvanized steel; Rust Oleum Corp. "Zinc Rich Cold Galvanizing Compound", Tnemec 90 93, ZRC Chemical Products Div. of Norfolk Corp. "ZRC Cold Galvanizing Compound" or Architect approved substitute.

## **2.2 MANUFACTURED ITEMS**

- A. Ships Ladder: O'Keeffe's 523 ships ladder. 75" angle aluminum construction or Architect approved substitute.
  - 1. O'Keeffe's, 100 N Hill Dr., #12, Brisbane, CA 94005, (888) 653-3333, [info@okeeffes.com](mailto:info@okeeffes.com), <https://okeeffes.com/>

## **2.3 FABRICATION, GENERAL**

- A. Workmanship:
  - 1. Use materials of size and thickness indicated or required to produce strength and durability in finished product for use intended.

2. Work to dimensions indicated,
  3. Form exposed work true to line and level with accurate angles and surfaces and straight, sharp edges.
  4. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated.
  5. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
  6. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces. Welds shall be imperceptible in the finished work.
  7. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use Phillips flat head countersunk screws or bolts for exposed fasteners, unless tamperproof security screws are indicated.
  8. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.
- B. Galvanizing: Provide zinc coating for items indicated or specified to be galvanized, as follows:
1. ASTM A153 for galvanizing iron and steel hardware.
  2. ASTM A123 for galvanizing both fabricated and un-fabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299-inch thick and heavier.
- C. Fabricate joints exposed to the weather to exclude water or provide weep holes.
- D. Shop Painting:
1. Shop paint miscellaneous metal work, except members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces.
  2. Remove scale, rust and other deleterious materials before applying shop coat. Clean off heavy rust and loose mill scale in accordance with SSPC SP 2, SP 3, or SP 7.
  3. Remove oil, grease and similar contaminants in accordance with SP 1.
  4. Brush or spray on primer in accordance with manufacturer's instructions, at a rate of 2.0 mils thickness for each coat.
  5. Apply one shop coat to fabricated metal items, except apply 2 coats to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish from the first.
  6. Primer on exposed to view items to be field painted shall be smooth and suitable for application of final finish coats specified in Section 09 91 00.
  7. Apply a heavy coat of bituminous paint, compounded for application in 30 mil coat, to metal surfaces in contact with concrete, masonry and dissimilar metals. Do not apply on exposed surfaces.

## **2.4 MISCELLANEOUS METAL FABRICATIONS**

- A. Ships Ladder:
1. Fabricate for locations indicated, with dimensions, spacing, and anchorages as provided.
  2. Use aluminum shapes for stringers.
  3. Use aluminum extruded treads with serrations, 4-inches wide.
  4. Design components and fastenings to support its own weight plus 100-psf distributed load and 300-pound concentrated load.
  5. Railings: Fabricate to details indicated. Railing shall withstand a minimum concentrated load of 200-pounds applied in any direction at any point on the top rail and a horizontal thrust of 50-pounds per linear foot.
  6. Finish: Clear anodized finish.

- B. Loose Bearing and Leveling Plates: Provide for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area. Drill to receive anchor bolts and for grouting as required. Galvanize after fabrication.
- C. Curb Nosings:
  - 1. Fabricate of structural steel shapes of welded construction with mitered corners and continuously welded joints.
  - 2. Provide anchors welded to nosings for embedding in concrete or masonry construction, spaced not more than 6-inches from each curb end, 6-inches from corners and 24-inches on center unless otherwise indicated.
  - 3. Finish: Galvanized
- D. Miscellaneous Framing and Supports:
  - 1. Provide miscellaneous framing and supports not a part of structural steel framework, as required to complete work.
  - 2. Fabricate to sizes, shapes and profiles shown or required.
  - 3. Fabricate from structural steel shapes and plates and steel bars of welded construction using mitered joints for field connection.
  - 4. Cut, drill and tap units to receive hardware and similar items.
  - 5. Furnish integrally welded anchors for casting into concrete or building into masonry.
  - 6. Finish: Galvanize exterior frames and supports, shop prime interior frames and supports.
- E. Steel Pipe or Tube Railings: Fabricate to design, dimensions and details indicated.
  - 1. Interconnect railing members by butt welding or welding with internal connectors.
  - 2. Provide coped joints at tee and cross sections.
  - 3. Form simple and compound curves by bending pipe or tubing in jigs to produce uniform curvature for each repetitive configuration. Maintain cylindrical cross section of pipe or tube throughout entire bend without buckling, twisting or deforming exposed surfaces.
  - 4. Close exposed ends of pipe by welding 3/16 inch steel plate in place or by using prefabricated fittings.
  - 5. Flanges, Fittings and Anchors: Provide end closures, flanges, miscellaneous fittings and anchors for interconnections of pipe or tubing and attachment of railings to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry.
  - 6. Finish: Galvanize steel railings, including pipe or tubing, fittings, brackets, fasteners, and other ferrous components.
- F. Bollards: Fabricate bollards from galvanized steel pipe of diameter and height indicated. Embed in concrete footings, fill with concrete and close top end by welding a 1/4 inch steel plate in place or provide a smooth concrete domed cap.

### **PART 3 EXECUTION**

#### **3.1 PREPARATION**

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors.

#### **3.2 INSTALLATION**

- A. General:
  - 1. Fastening to In Place Construction: Provide threaded fasteners for concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws and other connectors as required
  - 2. Cutting, Fitting and Placement:

- a. Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications.
  - b. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels.
  - c. Provide temporary bracing or anchors in formwork for items to be built into concrete, masonry or similar construction.
3. Fit exposed connections together forming tight hairline joints.
- a. Weld connections not shop welded.
  - b. Grind exposed joints smooth and imperceptible, and touch up shop paint coat.
  - c. Do not weld, cut or abrade the surfaces of exterior units which have been hot dip galvanized after fabrication, and intended for bolted or screwed field connections.
4. Field Welding: Comply with AWS for procedures of manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.
5. Install prefabricated items in accordance with manufacturer's instructions.
- B. Setting Loose Plates:**
1. Clean concrete and masonry bearing surfaces of bond reducing materials, and roughen to improve surface bond. Clean bottom surface of bearing plates.
  2. Set loose leveling and bearing plates on wedges, or other adjustable devices.
  3. Tighten anchor bolts after the bearing members have been positioned and plumbed.
  4. Cut off protruding ends of wedges flush with the edge of the bearing plate before packing with grout.
  5. Use metallic non shrink grout in concealed locations where not exposed to moisture; use nonmetallic non shrink grout in exposed locations.
  6. Pack grout solidly between bearing surfaces and plates to ensure no voids remain.
- C. Steel Pipe or Tube Railings:**
1. Adjust railings prior to anchoring to ensure matching alignment at abutting joints.
  2. Space posts as indicated.
  3. Plumb posts in each direction.
  4. Anchor posts in concrete by core-drilling concrete curbs to accommodate the posts. Fill annular space between post and curb solid with non-shrink, non-metallic grout mixed and placed to comply with grout manufacturer's directions.
  5. Anchor posts to steel with steel oval flanges, angle type or floor type as required by conditions, welded to posts and bolted to steel supporting members.
  6. Expansion Joints: Provide at intervals not exceeding 40 feet. Provide slip joint with internal sleeve extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; locate joint within 6 inches of posts.
- D. Bollards:** Anchor bollards in concrete with preset pipe sleeves. After bollards have been inserted into sleeves, fill annular space between bollard and sleeve solid with non-shrink, nonmetallic grout.

### **3.3 ADJUST AND CLEAN**

- A. Touch-Up Painting:** Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces:** Clean field welds, bolted connections and abraded areas and spot prime with specified primer applied to a minimum dry film thickness of 2.5 mils.

### **END OF SECTION**

**PART 1 GENERAL**

**1.1 WORK INCLUDED**

- A. Structural and non-structural framing and sheathing.
- B. Miscellaneous concealed and exterior lumber and sheet materials as shown or required.
- C. Roof curbs and cants.
- D. Blocking in wall and roof openings.
- E. Concealed wood blocking for support of washroom accessories and wall cabinets.
- F. Wood Blocking.
- G. Treatment of wood members where required.

**1.2 RELATED WORK**

- A. Division 1 - General Requirements
- B. Division 6 - Wood, Plastics and Composites

**1.3 REFERENCE STANDARDS**

- A. NFPA National Design Specification of Stress-Grade Lumber and its Fastening.
- B. WCLIB - West Coast Lumber Inspection Bureau: Standard Grading Rules for West Coast Lumber.
- C. WWPA - Western Wood Products Association.
- D. ASTM E84 - Fire Test.
- E. FS TT-W-571 - Wood Preservation: Treating Practices.
- F. California Building Code Title 24, Chapter 23.
- G. AWWA - American Wood Preservers' Association: Book of Standards.
- H. FS FF-N-105B – Common Wire Nails.
- I. National Design Specification

**1.4 QUALITY ASSURANCE**

- A. Lumber to have visible grade stamp of an agency certified by AF & PA.
- B. Provide written certification stating that materials provided meet specified requirements, including but not limited to their compliance with referenced standards relative to:
  - 1. Grade mark for the use intended
  - 2. Preservative treatment



- 3. Fire retardant treatment

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Protect materials from the weather while in transit. Place under cover and protect from weather immediately upon delivery.
- B. Store flat, off the floor, in a well-ventilated area where there will be no great variations in heat and humidity.
- C. All pieces of lumber shall be grade stamped with WCLIB or WWPA grade stamp.

**1.6 WARRANTY**

- A. Warrant the Work specified herein for two (2) years against becoming unserviceable or causing an objectionable appearance resulting from defects in materials and workmanship.
- B. Warrant that products comply with the Contract Documents and local use restrictions and are compatible with adjoining materials, substrates, and other installation conditions.
- C. Defects shall include, but not be limited to:
  - 1. Buckling or warping of surfaces
  - 2. Loose or missing parts
  - 3. Faulty installation, attachment, or alignment
  - 4. Deterioration due to lack or loss of preservative treatment

**PART 2 PRODUCTS**

**2.1 LUMBER**

- A. Lumber Species and Materials: Framing Lumber: Shall be Douglas Fir - Larch, unless noted otherwise, and shall comply with the grading rules of WWPA or WCLIB. All lumber shall be stamped as to grade by an approved grading agency. End-jointed lumber shall not be used. All structural wood members with the least dimension of 2 1/2" or greater shall be free of heart center. All sides surfaced. Grades as follows unless otherwise noted on Drawings:

	<b>USE Grade</b>	<b>Max Moisture Content at Time of Installation</b>
1-inch boards	"Construction"	19%
Beams & Headers	No. 1	19%
Roof & Ceiling Joists	No. 1	19%
Studs, Sills, Plates	No. 1	19%
Posts & Timbers	No. 1	19%
Miscellaneous Blocking & Framing Not Noted	No. 1	19%

- B. Preservative Treated Wood Materials: Pressure-treated in accordance with Standard Specifications of AWPA for treating structural timbers and FS TT-W-571.

**2.2 ACCESSORIES**

- A. Furnish and install all connecting hardware indicated on the Drawings specified herein or required to complete the work.

- B. Materials:
1. Nails, Screws, Bolts, and Fasteners: Hot-dipped galvanized steel for exterior, high humidity, and treated wood locations; plain finish elsewhere; size and type to suit the condition.
  2. Nails for light gauge metal connectors: Common wire nails, sizes as indicated or as specified by the metal connector manufacturer.
  3. Screws: Standard domestic manufacturer, bright steel - galvanized for exterior use. Brass, bronze, aluminum, or stainless when used to fasten items made of those metals.
  4. Screws: For attaching interior trim and finish to drywall partitions, use Type S, self-drilling, self-tapping anodized steel drywall screws of indicated lengths.
  5. Bolts: ASTM A307 machine bolts with standard hex nuts and steel plate or cut washers or carriage bolts with standard hex nuts and cut washers as indicated. Bolts, nuts, and washers wholly or partially exposed on the exterior shall be galvanized. Sill plate anchor bolts shall use 3" x 3" x 0.229" Plate Washers.
  6. Steel Plates and Angles: ASTM A36
  7. Lag Screws, Shear Plates, and Split Ring Connectors: As per American Forest & Paper Association "National Design Specifications for Wood construction."
  8. Framing Anchors, Joist Hangers, Etc: As made by Simpson Company and indicated on drawings or equivalent devices as approved by Architect. All framing connectors and joist hangers in contact with preservative-treated wood shall be coated to meet the requirements of CBC Section 2304.10.6.1. Connectors in contact with preservative-treated wood should have a minimum coating meeting the connector manufacturer's recommendations based on the type of preservative treatment used. At outdoor installations, in the absence of the manufacturer's recommendations, the connectors in contact with preservative-treated wood shall have a minimum coating meeting ASTM A653, type G185, per the CBC.
  9. Power Driven Inserts: "Hilti" or as approved by Architect; install as per manufacturer's directions.
  10. Miscellaneous Clips, Steel Assemblies: As per ASTM A36.
  11. Provide drilled anchors (i.e., Hilti Kwik Bolt TZ) as indicated on the plan in concrete. Torque test as indicated in the CBC and per table in Special Inspection Notes of construction drawing set.

## **2.3 BUILDING PAPER**

- A. Two (2) layers of 15 lb. felt

## **PART 3 EXECUTION**

### **3.1 SITE TREATMENT**

- A. Field apply a compatible preservative or fire-retardant treatment, as applicable, to site-sawn ends of treated members per the manufacturer's recommendations. Allow treatment to cure before placing members.
- B. Locations requiring preservative treatment:
1. Sill Plates for wood framing in contact with concrete or masonry.
  2. Blocking or grounds in contact with concrete or masonry.
  3. Blocking or grounds concealed in construction in such a manner as to prevent exposure to circulating air.
- C. Locations requiring fire retardant treatment:
1. Concealed backing and blocking within partition or ceiling construction.
  2. Other interior locations as shown or required by code.

**3.2 SELECTION AND USE OF LUMBER**

- A. Examine each piece of lumber separately. Select for strength, warp, and appearance, using the best pieces for the most demanding purposes.
- B. Discard inferior portions of members where shorter pieces are required.

**3.3 INSTALLATION**

- A. Execute carpentry Work carefully with neat cuts and close joints. Fit members to give firm seating and bearing.
- B. Place members true to lines and levels. Secure rigidly in place.
- C. Construct continuous members with pieces of the longest possible lengths.
- D. Install members where indicated or needed to provide proper nailing, furring, or bracing. Provide all blocking as required to hold Work in the proper position.
- E. Bore bolt holes only slightly larger than the size of the bolts. Provide washers for all bolts where heads or nuts bear on wood. Where required, countersink heads, nuts, and washers.
- F. Plywood Sheathing: Install plywood roof sheathing and subflooring with long dimension perpendicular to joints.
- G. Fire Blocking: Provide in accordance with CBC Section 718.

**3.4 FRAMING**

- A. General: Install all wood framing making proper provisions for work of other trades. Do all cutting of wood required to accommodate plumbing, heating and ventilating, electrical and other trades. Fit neatly around all exposed items, such as outlet boxes, conduits, pipes, and ducts.
- B. Exterior Base Plates or Bearing or Sheathed Wall Sills Resting on Concrete: Size all plates or sills and set level and true to line. Bolt down with bolts of size, length and spacing indicated, with a bolt four to twelve inches from the end of any piece. Each piece shall receive at least two bolts.
- C. Rough Framing: Fit closely; set accurately to required lines and levels and secure rigidly in place. Set horizontal and inclined members with the crown edge up. Do not cut, notch, or bore structural members without specific approval. Reinforce cut members as directed. Bolt, nail, and spike thoroughly with not less than the sizes and quantities indicated. Structural members shall provide full contact at all bearing surfaces. Joists shall be spliced over bearings unless shown otherwise.
- D. Studs: Make walls and partitions of nominal 2x4 or 2x6 studs, 16 inches on center, unless otherwise indicated or required to be larger to accommodate mechanical or electrical equipment, piping, and fixtures or the fixtures or equipment of any other trade. Unless otherwise indicated, all panels, valve covers, cleanouts, devices, access doors, recessed cabinet boxes, etc., shall be mounted flush with the adjacent wall surface. When any such item is of a depth where it is not practical to use solid studding to the full thickness of the wall, the wall shall be furred. When furring is required, it shall extend the full width of the room on the wall in which it occurs and from floor to roof or ceiling joists. The studs comprising all interior partitions and the wall material affixed to them shall extend from floor

to ceiling joist framing except as otherwise indicated. Staggered stud walls shall be constructed where indicated on drawings.

- E. Top Plates in Bearing Partitions: Shall be doubled and lapped at each intersection with walls or partitions. Stagger the joints in the upper and lower members of the top plate not less than 4 feet and splice as shown.
- F. Provide blocking not less than 2 inches in thickness of the same width as studs as shown on drawings. Also, install all fire stopping as required by Section 708 of the California Building Code.
- G. Frame corners solid where stud walls or partitions meet, or as indicated on drawings.
- H. Retighten anchor bolts before closing in.

### **3.5 WOOD BACKING AND NAILING STRIPS**

- A. Provide all wood backing, furring or blocking indicated or required for proper installation and attachment or work of other trades. Form lumber, which has been cleaned and is in sound conditions, may be used unless another material is indicated.
- B. Provide wood stripping where indicated for attachment of finish materials to wood or concrete surfaces

### **3.6 TOLERANCES**

- A. Framing Members: 1/4 inch maximum from the true position.
- B. Surface Flatness of Floor: 1/4 inch in 10 feet maximum.

### **3.7 CLEANUP**

- A. Upon completion of the installation activity, remove all waste, sawdust, dirt, wrappings, and excess materials, tools, and equipment. Thoroughly clean all surfaces to the satisfaction of the Architect.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 WORK INCLUDED**

- A. Includes but is not limited to:
  - 1. Wall sheathing
  - 2. Roof and floor sheathing

**1.2 RELATED WORK**

- A. Division 1 - General Requirements
- B. Division 6 - Wood, Plastics and Composites

**1.3 REFERENCES**

- A. CBC Title 24, Chapter 23
- B. PS-1 - Construction and Industrial Plywood
- C. PS-2 – Performance Standard for Wood-Based Structural Panels
- D. APA - American Plywood Association
- E. ASTM F1667 – Common Wire Nails
- F. National Design Specification

**1.4 QUALITY ASSURANCE**

- A. Plywood Grading Agency: Certified by APA

**1.5 REGULATORY REQUIREMENTS**

- A. Conform to the California Building Code, Chapter 23

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Store and protect products under provisions of Section 01 66 00
- B. All pieces of sheathing shall be stamped with a grade stamp

**PART 2 PRODUCTS**

**2.1 STRUCTURAL SHEATHING:**

- A. Sheathing shall conform to the requirements of U.S. Product Standard PS 1 or PS 2, and each piece shall be clearly and legibly grade-marked with established symbols of the American Plywood Association. Grades shall be as shown on the Drawings. Exterior glue is required.

**2.2 CONNECTING HARDWARE:**

- A. Furnish and install all connecting hardware indicated on the Drawings specified herein or required to complete the work.
- B. Materials:
  - 1. Nails for wood-to-wood connections for attachment of sheathing: Common wire or box, galvanized for exterior work and pressure-treated wood.

### **PART 3 EXECUTION**

#### **3.1 FRAMING**

- A. General: Install all wood framing making proper provisions for work of other trades. Do all cutting of wood required to accommodate plumbing, heating and ventilating, electrical and other trades. Fit neatly around all exposed items, such as outlet boxes, conduits, pipes, and ducts.
- B. Sheathing: Install roof sheathing and subflooring with long dimension perpendicular to joists. Install wall sheathing with long dimensions vertical. Sheathing shall have edges blocked and butted tightly and nailed for diaphragm or shear wall stresses as indicated on drawings. Sheathing panels in non-shear walls shall be spaced with a gap of 1/8" where installed under cement plaster finish. All sheathing shall be laid with the best face on the exposed side. Stagger joints if more than one layer is indicated. Machine nailing is subject to satisfactory job site performance.
- C. Provide blocking not less than 2 inches in thickness of the same width as studs as shown on drawings. Also, install all fire blocking as required by Section 718 of the California Building Code.

#### **3.2 SHEATHING**

- A. Secure wall sheathing horizontally perpendicular or vertically parallel to wall studs, with ends staggered over firm bearing. Provide solid blocking between sheathing.
- B. Secure roof sheathing perpendicular to framing members with ends staggered. Secure sheet edges over firm bearing. Provide solid blocking between sheathing.

#### **3.3 TOLERANCES**

- A. Framing Members: 1/4 inch maximum from the true position
- B. Surface Flatness of Floor: 1/4 inch in 10 feet maximum

**END OF SECTION**

**PART 1 GENERAL**

**1.1 DESCRIPTION**

- A. This Section describes the requirements for furnishing and installing glued-laminated structural units, including straight beams, girders and purlins, cambered members, columns, including posts and standards, and diagonal braces.

**1.2 RELATED WORK**

- A. Division 1 - General Requirements
- B. Division 6 - Wood, Plastics and Composites

**1.3 REFERENCES**

- A. California Building Code Chapter 23
- B. AITC – American Institute of Timber Construction
- C. ASTM D2559 – Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions
- D. ANSI A190.1 – American National Standard, Structural Glue Laminated Timber
- E. AWPA - American Wood Preservers' Association
- F. ALSC - American Lumber Standards Committee: Softwood Lumber Standards.

**1.4 SUBMITTALS**

All submittals shall be submitted under Division 1 - General Requirements provisions.

- A. Product Data: Not required.
- B. Shop Drawings:
  - 1. Show the full dimensions of each member and the layout of the entire structural system. Include large-scale details of connections connectors, and other accessories. Indicate species and stress grade of lumber, type of glue, and other variables. Verify all dimensions in the field.
- C. Samples: Not required.

**1.5 QUALITY ASSURANCE**

- A. Manufacturer's Qualification: Provide factory-glued structural units produced by an AITC licensed firm qualified to apply the AITC "Quality Inspection" mark.
- B. Factory mark each piece with an AITC Quality Inspection mark. Place AITC mark on timber surfaces, which will not be exposed in the complete work.
- C. Design: Where a portion of the final design is indicated as the manufacturer's responsibility, comply with applicable provisions of AITC 117.

- D. Erector: Company specializing in the erection of glue-laminated structural units with 2 years of documented experience.

## **1.6 DELIVERY, STORAGE & HANDLING**

- A. Keep glued-laminated structural units dry during delivery, storage, handling, and erection, by maintaining factory-applied protective covering in weather-tight and light-proof condition, or by applying other weather-tight protection.
- B. Maintain a protective covering until the building enclosure is completed, and until the final finishing of exterior work is ready to proceed.
- C. Do not store members in areas of high or low relative humidity.
- D. Time delivery to avoid extended on-site storage and to avoid delaying work of other Sections
- E. If laminated units are to be stored before erection, place individual units or bundle-wrapped units on blocks off the ground with individual members separated for air circulation. Leave wrappings intact but slit or puncture the lower side to permit water drainage.

## **PART 2 PRODUCTS**

### **2.1 GLUED-LAMINATED STRUCTURAL UNITS**

- A. Lumber: Comply with ANSI A190.1 and applicable lumber association's standard for allowable stress, appearance, fabrication limitations, and species.
- B. Preservative Treatment: Pressure-treated members exposed to weather or outside environment in accordance with AWWA C28 for water-borne preservatives. Discard pieces affected by treatment.
- C. Stress Values for Simple Span Beams and Purlins: Provide glued-laminated timber members sized as indicated, with laminating combination 24F-V4
- D. Stress Values for Continuous and Cantilever Beams and Girders: Provide glued-laminated timber members as indicated, with laminating combination 24F-V8
- E. Lumber Species: Douglas Fir, 24F-1.8E
- F. Adhesive: ASTM D2559, wet-use unless otherwise indicated.
- G. End Sealer: Manufacturer's standard transparent, colorless wood sealer, effective in retarding transmission of moisture at cross-grain cuts.
- H. Penetrating Sealer: Manufacturer's standard translucent penetrating wood sealer, which will not interfere with the application of wood finishes.
- I. Connectors, Anchors, Accessories: Fabricated steel shapes, plates and bars, ASTM A36, welded into assemblies of types and sizes indicated, or manufacturer's standard units. Provide steel bolts, lag bolts, nails, and other standard fasteners as required. Finish fabricated assemblies with rust-inhibitive primer. All connectors, anchors, and accessories for preservative-treated wood shall be coated to meet the requirements of CBC Section 2304.10.5.1.



## **2.2 FABRICATION**

- A. General: Comply with ANSI/AITC A190.1. Where dimensions are not completely documented, provide the manufacturer's standard sizes and shapes required to comply with specified requirements. Shop-cut connections and connecting hardware to the greatest extent feasible.
- B. Grade: Industrial Grade, complying with AITC 110. Exposed glue laminated units shall be of Architectural Grade.
- C. Camber: The required camber for the fabrication of each member is indicated on the Drawings and may be either circular or parabolic at the manufacturer's option. Do not camber exterior wall or fascia beams.
- D. Preservative Treatment: After laminating, dressing, sanding, and end-cutting each member to final size and shape, pressure treat timber complying with AWPA C28. Provide a preservative treatment solution free of water repellents and other substances that might interfere with finishing the application. Provide where indicated.
- E. End-Cut Sealing: After end-cutting each member to the final length and after wood treatment, apply a saturation coat of end sealer to ends and other cross-cut surfaces, keeping surfaces "flood-coated" for not less than 10-minutes.
- F. Seal Coat: After fabrication, sanding, and end-cut sealing, apply a heavy saturation coat of penetrating sealer on the surfaces of each unit, except for treated wood, where treatment has included a water repellent.

## **2.3 FACTORY APPLIED PROTECTION**

- A. Before shipping or exposing to outdoor conditions, individually wrap each member with the manufacturer's standard, opaque, durable, water-resistant, plastic-coated paper covering with water-resistant seams.

## **PART 3 EXECUTION**

### **3.1 INSPECTION**

- A. Verify that supports are ready to receive glued-laminated items.
- B. Verify sufficient end-bearing area.
- C. Beginning of installation means acceptance of existing conditions

### **3.2 INSTALLATION**

- A. Set structural members level and plumb in correct positions.
- B. Fit members together accurately without trimming, cutting, or unauthorized modification.
- C. Install miscellaneous steel connectors, anchors, and accessories as indicated.
- D. Cutting: Avoid cutting members during erection where possible. Except for fastener drilling and other minor cutting, coat cuts with end sealer as specified. Where treated members must be cut during erection, apply a heavy brush coat of the same treatment, complying with

AWPA Standard M4.

- E. Handle and temporarily support members to prevent visible surface damage.
- F. Do not remove wrapping or individually wrapped members until required for installation.
- G. Repair damaged surfaces and finish after the completion of erection and removal of wrappings or replace damaged members as directed by Architect.

**3.3 TOLERANCES**

- A. Framing Members: 1/2 inch maximum from the true position.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. This Section Includes:
1. Custom fabricated casework.
  2. Countertops.
  3. Solid Surfacing.
  4. Cabinet hardware.

**1.2 SYSTEM DESCRIPTION**

- A. Casework design and construction shall be in accordance with WI/AWI Architectural Woodwork Standards as follows:
1. Grade: Premium.
  2. Construction Style: A – Frameless.
  3. Construction Type: Type I – Multiple Self-Supporting Units.
  4. Door and drawer front style: Flush overlay.
  5. Shelves: Conform to WI requirements subject to a 50 psf uniformly spaced load not to exceed 200 pounds per shelf.
  6. Provide seismic anchorage in accordance with CBC.

**1.3 SUBMITTALS**

- A. General: Begin fabrication only after required approvals have been obtained.
- B. Shop Drawings:
1. Shop Drawings: Comply with Section 1 of WI/AWI Architectural Woodwork Standards – Basic Requirements for Architectural Millwork Shop Drawings. Submit as follows:
    - a. Submit 2 copies of shop drawings (11-inch by 17-inch minimum size).
    - b. Architect furnished drawings indicate form and profile concept only. Submit shop drawings to illustrate Fabricator's understanding of Architect's drawings and to show intended fabrication details. A photocopy or traced copy of architectural drawings is not acceptable.
    - c. Prepare shop drawings using field verified dimensions. Report any major discrepancies between Architect's drawings and field dimensions before work fabrication.
    - d. Indicate casework conditions, identified with location, grade, type of finish, and

wood species.

- e. Show casework in relation to adjacent construction with sectional drawings at full size or at 3 inch to 1 foot scale.
  - f. Coordinate dimensions of built-in equipment and fixtures. Show casework hardware indicating brand name and model used.
  - g. Show special accessory components not included in manufacturer's product data.
  - h. Show anchoring and attachment method. Show seismic restraint in accordance with CBC. Show method of scribing.
- C. Samples: Submit finish samples as follows:
- 1. Two 6-inch by 12-inch samples of each.
  - 2. Two 6-inch by 12-inch samples of each type of countertop finish.
  - 3. One sample of each type of cabinet hardware.

#### **1.4 QUALITY ASSURANCE**

- A. Qualifications:
- 1. Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section with a minimum 5 years' experience.
  - 2. Installer Qualifications: Firm specializing in installing work specified in this Section acceptable to manufacturer with experience on at least 5 projects of similar nature in past 3 years.
- B. Pre-Installation Meetings
- 1. Convene pre-installation meeting prior to commencing work of this Section.
  - 2. Coordinate work in this Section with work in related Sections. Coordinate work with plumbing and electrical rough-in. Ensure orderly and efficient sequencing of installation of interdependent trades, construction elements, and include provisions for future work.

#### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials and manufactured products only when the area is ready for installation, broom clean, totally enclosed, and the relative humidity is 50% or less at 70 degrees F.
- B. Storage and Protection: Store materials in a dry secure place. Protect from weather, surface contaminants, construction traffic, and other potential damage.

#### **1.6 MAINTENANCE DATA**

- A. Provide cleaning and maintenance information. Include hardware adjustment information.

### **PART 2 PRODUCTS**

**2.1 LUMBER**

A. Lumber: Conform to PS 20; Premium Grade in accordance with WI/AWI Architectural Woodwork Standards, Section 3. Dimensions as shown on drawings. Properties as follows:

1. Moisture Content: Kiln dried; moisture content 6% to 12%.

2. Wood Species:

Use	Species
Framing, internal construction.	Douglas Fir

**2.2 WOOD BASED PANELS**

A. Formaldehyde emissions of wood-based panels shall not exceed limits established by the Department of Housing and Urban Development (HUD) and 24 CFR, Section 3208.308. Products containing urea-formaldehyde resins shall not be allowed.

B. Softwood Plywood: Veneer-core plywood; conforming to PS 1, Exposure 1, Grade A-A, Group 1. Nominal thickness shall be as indicated in this specification and as shown on the drawings.

C. Particleboard: Meets or exceeds ANSI A208.1, Class M-2, minimum 45 lbs./ft<sup>3</sup> (720 kg/m<sup>3</sup>).

D. Medium Density Fiberboard (MDF): Meets or exceeds ANSI A208.2, Class SDF, minimum 45 lbs./ft<sup>3</sup> (720 kg/m<sup>3</sup>).

E. Hardboard: ANSI 135.4, Class 1 – Tempered; smooth-one-side (S1S), minimum 60 lbs./ft<sup>3</sup> (960 kg/m<sup>3</sup>).

F. Thermally Fused Melamine: Thermoset decorative overlays pre-laminated to substrate (hardboard, particleboard, or MDF as specified in this Section) by thermal fusion; performance characteristics equal to a general-purpose grade or liner grade high pressure laminate as per NEMA LD3.

**2.3 PLASTIC LAMINATE**

A. Manufacturers:

1. Acceptable Manufacturers:

- a. Basis of Design: Wilsonart Americas, see Finish Schedule Legend for color selections
- b. Pionite Decorative Surfaces
- c. Formica Corporation
- d. Or accepted equal.

B. High-Pressure Decorative Laminates: NEMA LD3; grades and thickness as follows:

Use/Application	NEMA LD3 Grade	Min. Thickness

Horizontal surface where post-forming is not required.	HGS or HGL	0.048 inch ± 0.005 inch (1.22 mm ± 0.127 mm)
Exposed vertical surfaces of casework components where post-forming is not required.	VGS	0.028 inch ± 0.004 inch (0.71 mm ± 0.012 mm)
Exposed vertical surfaces of casework components where post-forming is required for curved surfaces.	VGP	0.028 inch ± 0.004 inch (0.71 mm ± 0.012 mm)
Cabinet liner.	CLS	0.020 inch (0.51 mm)
Backing sheet. Provide at backside of plastic laminated panel substrates to enhance dimensional stability where laminate finish is applied to only one surface.	BK	0.020 inch (0.51 mm)

**2.4 SOLID SURFACING**

A. Manufacturers and Products:

1. Acceptable Manufacturers and Products:

- a. Basis of Design: Wilsonart Americas, see Finish Schedule Legend for color selections.
- b. Corian Solid Surfaces
- c. LG Hausys America, Inc., Product: Hi-Macs.
- d. Aristech Surfaces LLC, Product: Avonite Solid Surfacing.
- e. Or accepted equal.

B. Solid Surfacing: Non-porous homogeneous blend of acrylic or polyester alloys and fillers creating a solid surfacing material. Color and pattern shall extend throughout the material; 1/2-inch thick.

- 1. Provide countertops with integral sink bowls fabricated from solid surfacing material; sizes, dimensions, and configurations as indicated on Drawings.
- 2. Provide countertops fabricated from solid surfacing material; sizes, dimensions, and configurations as indicated on Drawings.

C. Solid Surfacing Accessories:

- 1. Joint Adhesive: Manufacturer's standard 2-part adhesive kit to create inconspicuous non-porous joints, with a chemical bond.
- 2. Panel Adhesive: Manufacturer's standard neoprene-based panel adhesive.
- 3. Sealant: Manufacturer's standard mildew resistant, FDA and UL recognized silicone sealant in color matching or clear formulations.

**2.5 ACCESSORIES**

- A. Edge Banding: PVC vinyl; 0.125 inch (3 mm) thick by 15/16 inch (23.8 mm) wide. Color and pattern shall closely match exposed door and drawer front laminate color and pattern as accepted by Architect.
- B. Vinyl Countertop Edge: PVC vinyl; 0.125 inch (3 mm) thick. Color and pattern shall closely match countertop laminate color and pattern as accepted by Architect.
- C. Fasteners: Nails, screws, and other fasteners of size and type best suitable for the purpose. Staples, screws, or T-nails not permitted at exposed surfaces. Staples and nails not permitted in casework joinery.
- D. Adhesives, Caulks, and Sealants:
  - 1. Adhesives and sealants shall meet VOC requirements of local Air Quality Management District.
  - 2. Adhesives shall be selected for their ability to provide a durable, permanent bond and shall take into consideration such factors as materials to be bonded, expansion and contraction, bond strength, fire rating, and moisture resistance.
  - 3. Wood Joinery: CS 35-61 Type II (water-resistant). Shall withstand cold-soak tests specified in PS 51-71.
  - 4. Laminate Adhesive: Water-based contact adhesive, type recommended by plastic laminate manufacturer.
  - 5. Caulk: 100% clear silicone – use to fill voids and joints between laminated components and adjacent surfaces.
  - 6. Sealant: Mold and mildew resistant; type and composition recommended by substrate manufacturer to provide a moisture barrier at sink cutouts and other locations where unfinished substrate edges may be subjected to moisture.

**2.6 CABINET HARDWARE**

- A. Hardware shall be furnished and installed as required to provide for a complete and operable casework installation. All hardware shall conform to ANSI/BHMA 156.9 Grade 2, except where a higher grade is specified.
- B. Manufacturers:
  - 1. Acceptable Manufacturers:
    - a. Accuride International Inc.
    - b. Blum Inc.
    - c. C.R. Laurence Co., Inc.
    - d. Claridge Products & Equipment, Inc.
    - e. Doug Mockett & Company, Inc.

- f. Gordon Aluminum Industries, Inc.
  - g. Häfele America Co.
  - h. Hettich America L.P.
  - i. Humanscale
  - j. Allegion/Ives
  - k. Knape & Vogt Manufacturing Company
  - l. CompX International Inc. (formerly National Cabinet Lock)
  - m. Rockford Process Control
  - n. Workrite Ergonomics, Inc.
  - o. Or accepted equal
- C. Hardware shall be furnished and installed as required to provide for a complete and operable casework installation. All hardware shall conform to ANSI/BHMA 156.9 Grade 2, except where a higher grade is specified.
- 1. Pulls: Doug Mockett & Co., Type DP128 Round Top Pulls, stainless steel.
  - 2. Hinges: RPC 456-26D (Dull Chrome).
  - 3. File and Drawer Slides: Accuride Model No. 3832, 100 lb., full extension, ball bearing, rail mount.
  - 4. Adjustable Shelf Supports: Hettich #50.016.721 Cadmium Plated Steel Sekura clips with earthquake pin conforming to ANSI/BHMA A156.9 Grade 1 requirements.
  - 5. Countertop Supports: U.S. Futaba, Inc. Workstation Bracket. Color: Black
  - 6. Locks: CompX National C8053-14A at doors, C8055-14A at drawers, and D8838 gang lock with core plug. All casework locks and keying shall match facility's casework needs and keying system. Locks shall be keyed in groups per functional operations.
  - 7. Cable Grommets: Doug Mockett & Co.: Type EDP, 2-1/2" diameter minimum, color: black.
  - 8. Monitor Arm Supports at Central Control: Humanscale Model M8 with crossbar, bolt-through mount.
  - 9. Wire Management: Doug Mockett & Co.: Style WM15A sections to underside of countertop.
  - 10. Elbow Catch: Ives, in chrome finish (typical at pairs of doors with lock).
  - 11. Pullout Keyboard: Workrite Model #2170-22TG pull-out adjustable arm with Model #185 ultra-thin leatherite platform.
  - 12. Sliding CPU Holder: Humanscale #CPU 555.



13. Aluminum Extrusions: Gordon; trim and reveals as indicated on drawings.

**2.7 FABRICATION**

- A. Fabricate and assemble casework components at the shop site to the maximum extent possible. Construction and fabrication of cabinets and their components shall meet or exceed WI grade requirements as indicated in this Section.
- B. Closely fit casework at site. Provide filler inserts and trim where necessary, scribe for a tight fit.
- C. Provide cutouts for inserts, grommets, and fittings. Install grommets where indicated on the drawings after site verification of locations and dimensions. Seal surfaces of cut edges.
- D. Plastic Laminates:
  - 1. Apply plastic laminate in full uninterrupted sheets, consistent with manufactured sizes.
  - 2. Fit corners and joints hairline. Slightly bevel arises.
  - 3. Secure plastic laminated panels with concealed fasteners.
  - 4. Apply laminate backing sheets to reverse side of panels with high-pressure decorative laminates on one face.

E. Sheet Materials Application:

Use/Application	Thickness	Wood-Based Panel
Casework carcass.	Min. 3/4-inch (19 mm)	Plywood, Particleboard, or MDF
Doors and drawer false fronts.	3/4-inch (19 mm)	Plywood, Particleboard, or MDF
Drawer box. Sides, backs, & sub-fronts. Bottom.	Min. 1/2-inch (12 mm), Max. 5/8-inch (16 mm)	Plywood, Particleboard, or MDF
	Min. 1/4-inch (6 mm)	Hardboard or MDF
Cabinet backs.	Min. 1/2-inch (12 mm)	Hardboard or MDF
Laminate clad countertops.	Min. 3/4-inch (19 mm)	Plywood, Particleboard, or MDF
Shelves: up to 32-inch (812 mm) span.	Min. 3/4-inch (19 mm)	Plywood, Particleboard, or MDF
Shelves: 32-inch up to 49-inch (812 up to 1244 mm)	Min. 1-inch (25 mm)	Plywood

F. Casework Carcass:

- 1. Glue frame components together. Brace top corners, bottom corners and cabinet bottoms with hardwood blocks, or metal or plastic braces.
- 2. Joinery Method: Acceptable joinery methods shall be as follows:

- a. Tops, exposed ends, and bottoms:
  - 1) Steel European assembly fasteners 1-1/2 inches (37 mm) from end, 5 inches (128 mm) on center. Fasteners shall not be visible on exposed parts.
  - 2) Doweled and glued under pressure – approximately 4 dowels per 12 inches (300 mm) of joint.
  - 3) Stop dado, glued under pressure, and either nailed, stapled or screwed. Fasteners shall not be visible on exposed parts.
  - 4) Spline or biscuit and glued under pressure.
- b. Cabinet backs (wall hung cabinets):
  - 1) Wall hung cabinet backs must not be relied upon to support the full weight of the cabinet and its anticipated load for hanging/mounting purposes. Method of back joinery and hanging/mounting mechanism should transfer the load to case body members.
  - 2) Fabrication method: Full bound, capture in grooves on cabinet sides, top, and bottom. Cabinet backs for floor standing cabinets shall be side bound, captured in grooves, glued and fastened to top and bottom.
- G. Drawer Assembly:
  1. Drawer box with drawer false front.
  2. Acceptable joinery methods:
    - a. Multiple dovetail (all corners) or French dovetail front/dadoed back, glued under pressure.
    - b. Doweled, glued under pressure.
    - c. Lock shoulder, glued and pin nailed.
    - d. Bottoms shall be set into sides, front, and back, 1/4 inch (6 mm) deep groove, with a minimum 3/8 inch (9 mm) standing shoulder.
  3. File Drawers: Unless otherwise indicated, direction of file folders shall be parallel to drawer door. Provide adequate, clear inside dimensions for hanging file folders. Minimum clear inside drawer dimensions shall be as follows:
    - a. Letter size file folders: Minimum 13-1/4 inches wide by 10-1/2 inches high.
    - b. Legal size file folders: Minimum 16-1/4 inches wide by 10-1/2 inches high.
- H. Shelving:
  1. Fixed shelves: Dadoed or doweled into cabinet sides.
  2. Adjustable shelves: 0.197 inch (5 mm) bore holes at 1-1/4 inch (32 mm) on center.
- I. Laminate Countertops and Backsplash:

1. Edge style: PVC edge banding.
2. Mechanically fasten back splash to countertops at minimum 16 inch on center.
3. Substrate shall be moisture-resistant where countertops receive sinks, lavatories, or are subject to liquids.

## **2.8 FINISH**

- A. Finish – Laminated Casework:
1. Drawer box: Thermally fused melamine.
  2. Semi-exposed surfaces (as defined in WI Manual of Millwork Section 15):
    - a. Cabinet with doors: Thermally fused melamine.
    - b. Cabinets with open shelves: High-pressure decorative laminate.
  3. Exposed surfaces (as defined in WI Manual of Millwork Section 15): High-pressure decorative laminate with PVC edge banding.
  4. Doors and drawer false fronts: High-pressure decorative laminate with PVC edge banding.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify field measurements, dimensions, location, and layout.
- B. Verify location and sizes of utility rough-in associated with work of this Section.
- C. Verify adequacy of backing and support framing.
- D. Report unacceptable conditions to the Project Manager. Begin installation only when unacceptable conditions have been corrected.

### **3.2 INSTALLATION**

- A. Install in accordance with accepted shop drawings and with applicable WI grade requirements as indicated in this Section.
- B. Install fabricated assemblies, level, plumb, square, and true to line, in locations as shown on the drawings. Attach and anchor securely to the floor and walls with mechanical fasteners appropriate for the substrate.
- C. Use concealed fasteners to attach and secure casework components, countertops, and plumbing fixtures.
- D. Carefully scribe casework abutting other components with a maximum gap of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Install solid surfacing per manufacturer's instructions.

- F. Install cable grommets in countertops at all casework knee-spaces and where shown on the drawings.

**3.3 ADJUSTING**

- A. Adjust moving or operating parts for smooth, uniform operation.
- B. Drawer slides shall be adjusted such that the drawer does not act as the stop.

**3.4 CLEANING**

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish surface or surrounding construction

**END OF SECTION**

**PART 1 – GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Provide thermal insulation system at exterior walls and acoustic batt insulation at interior walls with accessories as required for complete installation.

**1.2 SUBMITTALS**

A. Product Data: Furnish manufacturer's literature for each type of insulation.

1. Indicate thermal insulation name and number as included in California Energy Commission's Directory of Certified Material.
2. Submit Underwriter's Laboratory approval numbers for required fire ratings; approvals of other laboratories contingent upon acceptance of applicable authorities.
3. Installation Instructions: Submit manufacturer's installation instructions.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

A. Acceptable Manufacturers:

1. Knauf Insulation
2. Johns Manville
3. Owens-Corning Fiberglas Corp.
4. Certainteed.
5. Or accepted equal.

B. Materials

1. Exterior Wall Batt Insulation within closed wall cavity: R-21 Preformed kraft-faced fiberglass batts at all exterior wood framed walls.
2. Acoustic Batt Insulation at all Interior Walls: R-11 unfaced, u.n.o.
3. Insulation Supports: Galvanized or electroplated steel wire supports with friction attachment to framing.
4. Nails or staples: Steel wire; electroplated; type and size to suit application.
5. Line Wire: Galvanized steel, 19-gauge wire.

6. Wire Mesh: 1 1/2" x 17-gauge poultry netting.
  7. Accessories: Furnish as recommended by insulation manufacturer for insulation types, substrates, and conditions involved.
- C. Insulation shall comply with California standards for insulating material. Maximum flame spread rating of 25 and maximum smoke density per 2010 CBC Section 803.
1. Flame Spread/Smoke Density Rating: Maximum 25/450, ASTM E84.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify substrate and adjacent materials are dry and ready to receive insulation; beginning installation signifies acceptance of conditions.
- B. Ensure mechanical and electrical items affecting work are properly placed, complete, and have been inspected prior to commencement of installation.

#### 3.2 INSTALLATION

- A. Install insulation in accordance with manufacturer's instructions.
- B. Cut and trim insulation neatly, to fit spaces.
  1. Backed Insulation: Use insulation free of ripped backs and edges.
- C. Fit insulation tight within spaces and tight to and behind mechanical and electrical services within insulation plane; leave no gaps or voids; maintain integrity of thermal barrier.
- D. Maintain minimum ventilating airspace as required by the Drawings.
- E. Friction fit in place; use tape or friction supports as necessary to assure permanent installation.
  1. Taping: Tape joints and tears in vapor retarder, including joints between insulation and surrounding construction, to ensure vapor-tight installation.
  2. Penetration Supports: Cut or bend pins in locations accessible to maintenance personnel, to eliminate potential hazards from exposed pin points.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 WORK INCLUDED**

- A. Includes but not limited to:
  - 1. Rigid insulation at roof construction.

**1.2 SYSTEM DESCRIPTION**

- A. Materials of this Section shall provide a thermal and vapor barrier at building enclosure elements and provide positive drainage to the roof surfaces.

**1.3 SUBMITTALS**

- A. Product Data: Submit manufacturer's installation instructions under provisions of Section 01 33 00.
- B. Shop Drawings: Not required.
- C. Samples: Not required.

**PART 2 PRODUCTS**

**2.1 ACCEPTABLE MANUFACTURERS**

- A. RMAX
- B. ATLAS
- C. CELOTEX
- D. Substitutions: Refer to Section 01 60 00.

**2.2 MATERIALS**

- A. Rigid Insulation: FS HH-1-1972/1, Class 2 Polyisocyanurate rigid board, 2 lbs./cu ft. minimum density, both sides having glass fiberglass/organic facers, square edges, 25 psi compressive strength minimum, thickness as shown on the drawings. R-value of insulation at 75 degrees F to meet or exceed 23.0.
- B. Insulation shall comply with California quality standards for insulating material. Maximum flame spread rating of 25 and maximum smoke density not to exceed 450.
- C. Manufacturer's standard attachment discs and fasteners.
- D. Apply liquid foam around openings to provide tight seal.

**PART 3 EXECUTION**

**3.1 PREPARATION**

- A. Verify adjacent materials are dry and ready to receive installation.

- B. Sweep roof surfaces clean prior to installation.

**3.2 INSTALLATION**

- A. Install rigid insulation in accordance with manufacturer's instructions and in accordance with approved shop drawings.
- B. Apply insulation under same conditions as specified for application of roof membrane.
- C. Trim insulation neatly to fit spaces. Use panels free of damage.
- D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation. Leave no gaps or voids.
- E. Application of roof membrane shall immediately follow the application of the insulation.

**3.3 CLEAN-UP**

- A. Remove and dispose of excess insulation, wrapping and other waste materials.

**END OF SECTION**



**PART 1 GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Flashings and Sheet Metal Underlayment: Provide sheet membrane underlayment at flashings and sheet metal, with accessories as required for complete watertight installation.
2. Membrane Flashing at Penetrations: Provide sheet membrane underlayment and flashing for around penetrations through building paper including windows and doors, with accessories as required for complete watertight installation.
3. Sheet Membrane at Walls: Limit sheet membrane at walls to areas around penetrations through building paper (including doors and window penetrations) and at metal flashings.
  - a. Do not apply vapor retardant sheet membranes at areas indicated to receive foil-faced insulation; application of vapor retarder on both interior and exterior surface results in vapor lock which is detrimental to building.

**1.2 SUBMITTALS**

- A. Product Data: Furnish manufacturer's literature for each type of underlayment.
- B. Shop Drawings: Submit for metal flashings, as related to underlayment.
1. Clearly indicate general construction, configurations, jointing methods and locations, fastening methods and locations and installation details.
- C. Samples: Furnish samples of each material.

**1.3 QUALITY ASSURANCE**

- A. Pre-Installation Meeting: Convene one week prior to commencing work; require attendance of parties directly affecting underlayment.
1. Review procedures and coordination required with related work.

**1.4 WARRANTY**

- A. Special Warranty: Provide for correcting failure of underlayment to resist penetration of water. Repair underlayment and pay for or replace damaged materials or surfaces.
1. Special Warranty Period: Two years.

**PART 2 PRODUCTS**

**2.1 MATERIALS**

- A. Sheet Metal and Flashing Underlayment: Rubberized sheet membrane with primers and seam sealers as required for complete watertight installation; type as recommended by

manufacturer for substrate and for applications indicated.

1. Manufacturers:
  - a. Grace Construction Products: Vycor V40.
  - b. Carlisle Corp.
  - c. Protecto Wrap Company.
  - d. Substitutions: Refer to Section 01 60 00.
- B. Membrane Flashing at Penetrations: Rubberized sheet membrane with primers and seam sealers as required for complete watertight installation; type as recommended by manufacturer for substrate and for applications indicated.
  1. Manufacturers:
    - a. Grace Construction Products: Vycor V40.
    - b. Substitutions: Refer to Section 01 60 00.
- C. Concealed Metal Flashings Integral with Underlayments: Minimum 26 gage thick steel with minimum 0.90 oz/sq.ft. galvanized coating; ASTM A653.
  1. Fasteners: Standard round wire type of hot dipped galvanized steel; minimum 19/64" head diameter and 0.104" shank diameter; minimum 7/8" long.
- D. Bituminous Paint: Acid and alkali resistant type; black color.
- E. Accessories: Provide as recommended by underlayment manufacturers for specific applications.
  1. Plastic Cement: Cutback asphaltic type with mineral fiber components, for sealing and coating flashings; free of toxic solvents and free of asbestos. Capable of setting within 24 hours at temperatures of approximately 75 degrees F and 50% R.H.
- F. Volatile Organic Compound (VOC) Emissions: Provide materials conforming to applicable air quality management district limitations on volatile organic compound (VOC) emissions.

## **2.2 FLASHING FABRICATION**

- A. Fabricate metal flashings as recommended by Sheet Metal and Air Conditioning Contractors National Association (SMACNA) "Sheet Metal Manual".
- B. Form flashings to drain water to exterior at roofing and siding construction for penetrations, sill and header flashings.
- C. Form sections square, true and accurate to size, in maximum possible lengths and free from distortion and other defects detrimental to appearance or performance.
- D. Hem exposed edges of metal flashings minimum 1/4" on underside.
- E. Apply bituminous paint on concealed surfaces of metal flashings.

**PART 3 EXECUTION**

**3.1 PREPARATION**

- A. Install underlayment over surfaces that are dry, free of ridges, warps and voids that could damage paper.
- B. Weatherlap joints minimum 2" and seal with plastic cement; secure in place.
- C. Coordinate installation with installation of components and items projecting through underlayment.

**3.2 FLASHINGS INSTALLATION**

- A. Install flashings as recommended by Sheet Metal and Air Conditioning Contractors National Association (SMACNA) "Sheet Metal Manual".
- B. Weather-lap joints minimum 2" and seal with plastic cement; secure in place.
- C. Fastenings: Concealed in completed installation.

**3.3 UNDERLAYMENT INSTALLATION**

- A. Install underlayment in accordance with recommendations of underlayment manufacturer and of manufacturer's of products to cover underlayment; comply with applicable code requirements.
  - 1. Layers: Weather-lap joints as recommended by system manufacturer, not less than 2" at building paper.
    - a. Plaster: Provide two layers building paper underlayment installed in one application with 36" sheets lapped 18" each.
    - b. Other Areas: Provide one layer sheet membrane underlayment.
  - 2. Secure underlayment in place, stagger joints between layers; lap ends minimum 6"; stagger end joints.
  - 3. Apply layer of sheet membrane underlayment extending minimum 18" from penetrations, including windows and doors; start at bottom of penetration and weather-lap joints; apply top layer over metal flashing to direct water to exterior.
- B. Apply plastic cement to substrate prior to application of underlayment starter strips to prevent capillary movement of water back up beneath underlayment.
- C. Weather-lap items projecting through underlayment and seal with plastic cement at building paper underlayment, with sealer recommended by sheet membrane underlayment manufacturer at sheet membrane underlayment.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 WORK INCLUDED**

- A. Mechanically attached PVC sheet membrane roofing system.
- B. Underlayment Board.
- C. Coated flashings and trim.
- D. Rigid insulation at roof construction.
- E. Tapered cricket system.
- F. Walkway membrane (Traffic Pads).

**1.2 QUALITY ASSURANCE**

- A. Membrane Manufacturer: Prime membrane manufacturer, specializing in single ply roof membranes with five years experience.
- B. Applicator: Company specializing in installation of single ply roof membranes approved by membrane manufacturer.

**1.3 REGULATORY REQUIREMENTS**

- A. Underwriters Laboratories, Inc (UL) Class A Fire Hazard Classification.

**1.4 SUBMITTALS**

- A. Shop drawings detailing special joint or termination conditions and conditions of interface with other materials.
- B. Product data for sheet membrane, elastic flashing, joint cover sheet, and joint and crack sealants, with temperature range for application of membrane.
- C. Manufacturer's installation instructions.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- B. Store products in weather protected environment, clear of ground and moisture.
- C. Store insulation and cover board dry and protected from the elements. Store insulation on pallets and completely cover with a breathable material such as tarp or canvas. Remove or slit temporary factory-applied packaging to prevent accumulation of condensation. Do not use wet or damaged insulation.
- D. Store roofing membrane in the original undisturbed plastic wrap.
- E. Store adhesives, sealants, and other curable materials in cool and dry location with

temperatures between 60 and 90 degrees F. Do not store adhesive containers with opened lids due to the loss of solvent which occur from flash off.

**1.6 ENVIRONMENTAL REQUIREMENTS**

- A. Do not apply roofing system during inclement weather.
- B. Do not apply roofing system to damp or frozen substrate.
- C. Take precautions to prevent wind blow-off or wind damage during the course of the roofing application.
- D. Substrates to receive roofing system shall be thoroughly dry. Provide drying equipment should moisture occur.

**1.7 PREINSTALLATION CONFERENCE**

- A. Convene a pre-installation conference one week prior to commencing work of this Section.
- B. Require attendance of parties directly affecting work of this Section.
- C. Review conditions of installation, installation procedures, and coordination required with related work.

**1.8 MOCKUP**

- A. Provide mockup of installed membrane prior to commencement of work.
- B. Mockup to represent conditions of finished work including internal and external corners, Seam jointing, attachment method, sealing and counterflashing cover, control and expansion joints.

**1.9 EXTRA STOCK**

- A. Provide the Owner with 72 sq. ft. of roofing membrane along with the compatible hand held hot-air welding tool and written instructions for the repair of minor defects and punctures to the membrane; for his use.

**1.10 WARRANTY**

- A. Warranty installed membrane roofing system including labor and materials and loss of water-tightness caused by defective materials (including accessories) or workmanship, with no dollar limit, for 20 years. Effective warranty start date shall be at the time of final acceptance by County.
- B. Warranty shall provide for the removal, replacement, repair, and making good without cost to the County, of defects due to defective materials or workmanship.
- C. Repairs under warranty shall be made within three days after receiving notice of need for repairs from the County, weather permitting.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products.
  - 1. PVC Roofing Membrane System.
    - a. Duro-Last Roofing, Inc.
  - 2. Gypsum Underlayment board.
    - a. G-P Gypsum Corp.: DensDeck roof board.
    - b. Or accepted equal.
  - 3. Roof Insulation.
    - a. Atlas Roofing Corp.
    - b. Rmax, Inc.
    - c. Firestone Building Products Co.
    - d. GAF Materials Corp.
    - e. John Mansville
    - f. Or accepted equal.

**2.2 OWNER FURNISHED MATERIALS**

- A. Materials for repair of the fire damaged roofing assembly are Owner-Furnished-Contractor-Installed (OFICI). Material types and quantities furnished and delivered by Owner are limited to the following list. Any additional materials necessary to complete the repair shall be provided by the contractor and be included in the contractor's base-bid amount.

<b>Owner Furnished Materials</b>		
<b>Qty</b>	<b>Units</b>	<b>Description</b>
10	Squares	3" thick Rigid Insulation (match existing)
5	Squares	1/4" DensDeck Prime
12	Squares	60 mil Duro-Last PVC
4	Boxes of 500	8" Fasteners
2	Buckets of 1,000	Cleat Plates
2	Buckets of 500	Insulation Plates

1	Each	Custom Curb Flashing
1	Each	Pipe Jacks
4	Each	Caulking
2	50 pack	Circle Patches
4	Each	Two-way vents

**2.3 POLYVINYL-CHLORIDE ROOFING MEMBRANE - PVC**

- A. PVC Sheet: ASTM D 4434, Type III, fabric reinforced. Thickness: 60 mils, minimum.

**2.4 AUXILIARY ROOFING MATERIALS – SINGLE PLY**

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
  - 1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.
    - a. Sheet Flashing: Manufacturer's sheet flashing of same material, type, reinforcement, thickness, and color as sheet membrane.
    - b. Sheet Flashing: Manufacturer's unreinforced sheet flashing of same material as sheet membrane.
    - c. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.
    - d. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, with anchors.
    - e. Metal Battens: Manufacturer's standard aluminum-zinc-alloy-coated or zinc-coated steel sheet, prepunched.
    - f. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
    - g. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, sealants, and other accessories.

**2.5 WALKWAYS**

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads sourced from membrane roofing system manufacturer.

**2.6 UNDERLAYMENT BOARD**

- A. Gypsum Board: ASTM C1177, glass-mat faced, water-resistant gypsum substrate, 1/4 inch at.

## **2.7 ROOF INSULATION**

- A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II.
  - 1. Provide insulation package with R Value greater than 30.

## **2.8 TAPERED INSULATION**

- A. Tapered Insulation: ASTM C 1289, provide factory-tapered insulation boards fabricated to slope of 1/2 inch per 12 inches unless otherwise indicated.

## **2.9 INSULATION ACCESSORIES**

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
- B. Provide factory preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
- C. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and furnished by roofing system manufacturer.
- D. Urethane Adhesive: Manufacturer's two component urethane adhesive formulated to adhere insulation to substrate.
- E. Wood Nailer Strips.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Report unacceptable conditions to the Architect. Begin installation only when unacceptable conditions have been corrected and only when substrate is inspected and accepted by roofing installer and roofing system manufacturer.
- B. Verify that surfaces and site conditions are ready to receive work.
- C. Verify that deck is structurally sound to secure mechanical fastened single ply roofing system. Inspect roof deck for corrosion, rotting, warping, concrete spalling, etc. Repair or replace defective roof deck prior to installing the roofing system.
- D. Verify that deck surfaces are dry to the touch and free of snow or ice.
- E. Verify that deck is clean and smooth, free of noticeable high spots or depressions, and have a positive slope to drains or valleys.
- F. Perform pullout tests as per ANSI/SPRI FX-1 at a minimum of 10 pullout tests for areas up to 500 squares, thereafter, add one test for every 2 percent of the field areas.



- G. Verify that roof openings, curbs, pipes, sleeves, ducts and vents through roof are solidly set. Verify and ensure that all roof drain lines are clear.

### **3.2 PREPARATION**

- A. Protection: Protect roofing surface and adjacent work against damage to roofing work.
- B. Review Material Safety Data Sheet and safety regulations recommended by OSHA.
- C. Wood Nailers:
  - 1. Install pressure treated wood nailers in appropriate size and location when required by the membrane manufacturer for a warrantable system.
  - 2. Anchor to the roof deck at 2 feet maximum on center to resist a pullout force of 175 pounds per foot in any direction. Install fasteners within 6 inch of each end. Spacing and fastener embedment shall conform to Factory Mutual Loss Prevention Data Sheet 1-49.
  - 3. Top of nailers shall be flush to the roof insulation.

### **3.3 PREPARATION OF SUBSTRATE**

- A. General: To prevent delays or interruptions, coordinate with other work to ensure that components to be incorporated into the roofing system are available as the work progresses. Examine substrates to which the roofing materials are to be applied to ensure that their condition is satisfactory for the roofing systems application. Do not permit voids greater than 1/4 inch width in the substrate. Substrates for roofing materials shall be dry and free of oil, dirt, grease, sharp edges and debris. Inspect substrates and correct defects before application of roofing membrane.
- B. Determine the condition of the structural substrate. Areas with deteriorated or damaged decking or other materials shall have those affected materials removed and replaced.
- C. Provide temporary water cut-offs at the end of each day. Maintain watertight condition of roof. Remove only that amount of roofing and flashing that can be made watertight with new materials in a one-day period or prior to the onset of inclement weather.
- D. Cover decking with rigid insulation, and cover board, applied in accordance with manufacturer's instructions and as required resulting in a UL Class A roof system.

### **3.4 INSULATION INSTALLATION**

- A. Place insulation over clean roof deck where indicated on drawings in accordance with manufacturer's instructions.
- B. Install insulation in specified thickness. Install additional thickness at crickets as required to meet requirements indicated on the drawings.
- C. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- D. Apply no more insulation than can be covered with cover board and membrane in same day.
- E. Tape joints of insulation in accordance with insulation manufacturer's instructions.

- F. Stagger all joints when multiple layers or types of insulation are being installed.

**3.5 GYPSUM UNDERLAYMENT BOARD INSTALLATION**

- A. Place cover board over clean insulation or plywood roof substrate.
- B. Fasten with disk-type fasteners as recommended by cover board manufacturer.
- C. Stagger all joints a minimum of 6 inches from underlying insulation joints.

**3.6 ROOFING MEMBRANE PLACEMENT, ATTACHMENT AND HOT AIR WELDING**

- A. General: Install membrane in accordance with manufacturer's instructions.
- B. Sweep substrate of all loose debris before laying membrane.
- C. Mechanically-Fastened Single-Ply Roofing System
  1. Roll out membrane free from wrinkles or tears. Place sheet into place without stretching. Allow the membrane to relax at least 15 minutes when the temperature is above 60 degrees F or 40 minutes when the temperature is below 60 degrees F prior to installation. Inspect for damage. Remove sections of membrane that are creased or damaged. Lap sheets as recommended by manufacturer.
  2. Perimeter: When installing roofing, where walls do not exceed or equal 24 inches in height, install a minimum of one sheet parallel with the perimeter and fasten with fastening system at the predetermined spacing in the lap area in a line centered approximately 1-1/2 inch from the edge of the sheet leaving 1/2 inch of membrane outside the disc. Weld lap area to metal base flashing continuously a minimum of 1-1/2 inches weld width.
  3. Field Areas: Run membrane perpendicular to roof slope. Install membrane overlaps to facilitate the flow of water. Overlap membrane sheets as recommended by manufacturer to provide space for fastener and disc placement for a continuous 1-1/2 inch width weld.
  4. Seal membrane continuous around all roof penetrations.
- D. Fully-Adhered Single-Ply Roofing System at Vertical Surfaces.
  1. Position membrane over the substrate.
  2. Fold membrane sheet back so half the underside is exposed.
  3. Stir bonding adhesive thoroughly scraping the sides and the bottom of the can (5 minutes minimum). Bonding surfaces must be dry and clean.
  4. Apply bonding adhesive to the exposed underside of the membrane and the corresponding substrate area. Do not apply adhesive along the splice edge of the membrane to be hot air welded over adjoining sheet.
  5. Apply adhesive evenly, without puddles using a plastic core medium nap roller to achieve continuous coating of both surfaces at a coverage rate recommended by adhesive manufacturer.
  6. Due to solvent flash-off, condensation may form on freshly applied bonding adhesive

when the ambient temperature is near the dew point. If condensation develops, possible surface contamination may occur and the application of bonding adhesive must be discontinued. Allow the surface to dry and apply a thin freshener coat to the previously coated surface when conditions allow for continuing.

7. Allow adhesive to dry until it is tacky but will not string or stick to a dry finger touch.
  8. Roll the coated membrane into the coated substrate while avoiding wrinkles.
  9. Brush down the bonded section of the membrane sheet immediately after rolling the membrane into the adhesive with a soft bristle push broom to achieve maximum contact.
  10. Fold back the unbonded half of the sheet in the same manner, overlapping edges a minimum of 2 inch to provide for a minimum of 1-1/2 inch hot air weld.
  11. Install adjoining membrane sheets in the same manner, overlapping a minimum of 2 inch to provide a minimum of 1-1/2 inch hot air weld.
  12. Protect completed sections of the roof so bonding adhesive will not discolor the membrane surface. Do not place bonding adhesive containers or their lids directly on the surface of the membrane.
- E. Welding of Laps:
1. General:
    - a. Roofing membrane connection shall be hot air welded only.
    - b. Surfaces to be welded shall be clean and dry.
  2. Hot Air Welding:
    - a. Hot air weld the membrane sheets with an automatic hot air welding machine. Follow hot air welding machine manufacturer's instructions for use.
    - b. Where use of automatic hot air welding machines is not practical, use a hand-held hot air welding machine. Preheat the nozzle tip and apply over the overlap area until the material reaches required temperature, immediately follow with a hand roller to press the heated membrane surfaces together with slow, even movements. Keep the roller within one inch of the nozzle tip. Seam strength may be tested when cool. For best results, test seams 8 hours after hot air welding.
  3. Quality Control of Seams: After seaming, check welded seams for continuity and integrity. Repair openings or "fishmouths" with a hand-held hot air tool fitted with a narrow nozzle tip and with a roller.
  4. Membrane lap edges that have been exposed to the elements for approximately 7 days or longer must be prepared with manufacturer-approved membrane cleaner. Prepare the surface where the cleaner has been applied as per manufacturer's instructions prior to hot air welding.

### **3.7 MEMBRANE FLASHING**

- A. Flash all vertical surfaces with reinforced membrane. Use non-reinforced membrane only at inside and outside corners, field fabricated pipe seals, scuppers, and sealant pockets where

the use of premolded accessories are not practical. Terminate the flashing in accordance with manufacturer-approved detail.

- B. Use bonding adhesive on vertical surfaces more than 12 inches high such as walls, curbs, and pipes. Bonding adhesive is not required for vertical surfaces terminated under a metal counter flashing less than 12 inches high. Bonding adhesive may be eliminated for flashing heights 18 inches or less when a coping or termination bar is used for vertical terminations.

### **3.8 OTHER RELATED WORK**

- A. Walkways: Heat weld walkway pads as directed by the manufacturer and as shown on the drawings.
- B. At the underside of exposed decking, cover fastener tips of protruding fasteners with heat-shrink wrap tubing. Paint to match existing color or new paint where occurs

### **3.9 FIELD QUALITY CONTROL**

- A. General: Comply with requirements of Section 01 40 00 "Quality Requirements".
- B. The manufacturer's representative/technical inspector shall observe, conduct tests, and prepare test reports in accordance with the provisions of this Section at predetermined periods before, during, and after installation of the work – specifically at critical periods identified by roofing system manufacturer to ensure a completely warranted system.
- C. The manufacturer's representative/technical inspector and the testing agency shall conduct final roof inspection on completion of the work in this Section and submit report to Engineer. Notify Engineer 48 hours in advance of date and time of inspection.

### **3.10 CLEANING**

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage surface or surrounding construction.
- B. Where traffic must continue over finished roof membrane, protect surfaces.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Exterior wall flashings.
- B. Roof flashings.
- C. Pre-manufactured copings.
- D. Pre-manufactured roof penetration flashings.
- E. Reglets.

**1.2 SUBMITTALS**

- A. Shop drawings and Product Data: Describe material profile, jointing pattern, jointing details, fastening methods and installation details.

**1.3 QUALITY ASSURANCE**

- A. Applicator: Company specializing in sheet metal flashing work with sufficient documented experience.

**1.4 SYSTEM DESCRIPTION**

- A. Work of this Section is to physically protect roofing and exterior from damage that would permit water leakage to building interior.

**1.5 DELIVERY, STORAGE AND HANDLING**

- A. Stack preformed material to prevent twisting, bending or abrasion, and to provide ventilation.
- B. Prevent contact with materials during storage that may cause discoloration, staining or damage.

**PART 2 PRODUCTS**

**2.1 PREMANUFACTURED COPINGS**

- A. Manufacturers:
  - 1. W.P. Hickman Systems, Inc.
  - 2. Tremco.
  - 3. Metal Era.
  - 4. Permatite.
  - 5. Pac-Clad
  - 6. Or accepted equal.

- B. Copings: Modular Coping System.
  - 1. Coping shall be 0.063 thick aluminum with smooth surface.
  - 2. Sizes as required to accommodate varying wall thicknesses.
  - 3. Splice joints shall have 6" long concealed splice plates at 10'-0" on center. Allow 1/4" at all butt joints per 10'-0" length.
  - 4. Prefabricated corners shall be shop mitered and shop welded.
  - 5. All fasteners shall be concealed.
  - 6. Finish: Pre-finished Kynar, color as selected by Architect.

## **2.2 PREMANUFACTURED ROOF PENETRATION FLASHINGS**

- A. At new thermoplastic membrane roofing:
  - 1. Pipe Portal System as manufactured by Portals Plus or accepted equal. System shall consist of the following:
    - a. Roof Curb: Straight sides, 18 gauge, ASTM A653 G90 galvanized iron with mitered and welded corners, softwood lumber wood nailers on all four sides, EPDM gaskets, and insulated on all four sides with 1-1/2 inch thick, 3# density rigid fiberglass insulation.
    - b. Curb Cover: One piece molded ABS plastic laminated with an ultraviolet-resistant acrylic coating. Cover shall be molded with reinforcing ribs on the top surface, crowned to shed water, and have integral counterflashing with drip edge and pre-punched perimeter holes for field attachment to perimeter nailer of curb. Provide a molded sealing ring around the perimeter of the molded collared penetration openings.
    - c. Pipe Boots: Compression molded EPDM rubber caps mechanically sealed to curb cover using two beads formed into the collar of the cover mated with double grooves molded into the inside of the cap. Provide manufacturer's standard adapter rings as required for a watertight installation. Size and type: As required for size and number of pipes to be flashed.
    - d. Stainless steel clamps for final securement of pipe boots around penetrations.

## **2.3 REGLETS**

- A. Reglets: W.P. Hickman Fry; MM Systems; Superior; or accepted equal, Products:
  - 1. Masonry Flashing System: In-Wall Drive Lock Reglet and Counter Flashing. Material shall be 0.025 inch thick aluminum with gray polyester coating.
  - 2. Flashing Clip: Windlok Clip. Pre-drilled, non-continuous 1 1/4" x 2 1/2" metal strap.

## **2.4 ACCESSORIES**

- A. Fasteners: Stainless steel with soft neoprene washers. Finish exposed fasteners same as flashing metal.

- B. Protective Backing Paint: FS TT-C-494A. Bituminous.
- C. Sealant.
- D. Bedding Compound: Rubber-asphalt type.
- E. Plastic Cement: FS SS-C-153, Type I-asphaltic base cement.
- F. Solder: ASTM B32; 95-5 Tin Antimony type.
- G. Flux: As recommended by sheet metal manufacturer.

## **2.5 FABRICATION**

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Fabricate cleats and starter strips of same material as sheet, interlockable with sheet.
- C. Form pieces in longest practical lengths.
- D. Hem exposed edges on underside 1/2"; miter and seam corners.
- E. Form material with flat lock seam.
- F. Solder and seal metal joints watertight. After soldering, remove flux. Wipe and wash solder joints clean.
- G. Fabricate corners from one piece with minimum 18" long legs; seam for rigidity, seal with sealant.
- H. Fabricate vertical faces with bottom edge formed outward 1/4" and hemmed to form drip.
- I. Expansion-contraction of sheet metal runs: Provide flat, loose locking slip joint at maximum of 10-foot intervals.

## **PART 3 EXECUTION**

### **3.1 INSPECTION**

- A. Verify shapes and dimensions of surfaces to be covered.
- B. Verify substrates are clean, dry, smooth, and free of defects to the extent needed for sheet metal work.
- C. Beginning of installation means acceptance of existing conditions.

### **3.2 PREPARATION**

- A. Field measure site conditions prior to fabricating work.
- B. Install starter and edge strips, and cleats before starting installation.

- C. Install reglets true to lines and levels. Seal top of reglets with sealant.
- D. Insert flashings into reglets to form tight fit. Secure in place with plastic wedges at maximum 12" on center. Seal flashings into reglets with sealant.
- E. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations acceptable to Architect.
- F. Lock and seal all joints.
- G. Apply plastic cement compound between metal flashings and felt flashings.
- H. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- I. Solder metal joints watertight for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.
- J. Seal metal joints watertight.

### **3.3 INSTALLATION**

- A. Fabricate and install items in conformance with drawing details and SMACNA and NRCA manuals.
  - 1. Install pre-manufactured items such as copings and roof penetration flashings per manufacturer's recommendations.
- B. Ensure that items are installed in true and accurate alignment with other items and related work; that joints are accurately fitted; that exposed surfaces are free from dents; that corners are reinforced; that seams are watertight.
- C. All work shall be left free of passivators, oil, grease, or acid residue, ready to receive painter's finish.
- D. Wherever possible, all fasteners shall be concealed. All exposed fasteners shall have neoprene gaskets and be capped with a bead of sealant.
- E. Install counter-flashings in reglets with continuous bead of sealant.

### **3.4 TOUCH-UP**

- A. Where galvanized finish is damaged by fabrication or installation, repair with specified touch-up material, applying in accordance with manufacturer's printed instructions.

**END OF SECTION**



**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Sealants.
- B. Primers.
- C. Bond breakers.
- D. Backstops.
- E. Cleaning Solvents.

**1.2 SUBMITTALS**

- A. Product Data: Submit manufacturer's descriptive literature and product specification for each product.
- B. Samples: Submit manufacturer's standard color ranges of exposed sealant materials for Architect's selection.
- C. Quality Assurance/Control Submittals:
  - 1. Product validation/assurance submittals.
  - 2. Manufacturer's laboratory adhesion and stain testing results.
  - 3. Joint sealants field adhesion to joint substrates test results.
- D. Closeout Submittals:
  - 1. Cleaning and maintenance data.

**1.3 QUALITY ASSURANCE**

- A. Qualifications:
  - 1. Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section.
  - 2. Applicator Qualifications: Firm specializing in installing work specified in this Section with experience on at least 5 projects of similar nature in past 3 years.
- B. Product Validation/Assurance: Provide products with current SWRI Validation or provide independent third-party laboratory test results showing product meets performance requirements in accordance with ASTM C920 and as specified in this Section.
- C. Manufacturer Adhesion and Stain Testing: Provide manufacturer's laboratory adhesion (per ASTM C719 and C794) and stain testing (per ASTM C510) using specimens of actual substrates to ensure sealant compatibility with substrate before product acceptance.
- D. Joint Sealants Field Test for Adhesion to Joint Substrates: Perform field tests for each

elastomeric joint sealant with the manufacturer's representative present prior to installation as follows:

1. Install joint sealants in 5-foot joint lengths. Allow sealant to fully cure before testing.
  2. Make a knife cut of the sealant across the joint and along each side of the joint approximately 3 inches long.
  3. Place a mark on the sealant tab, 1 inch from the adhered joint to the tab's free end.
  4. Grasp a 2-inch piece of sealant firmly just beyond the 1-inch mark and pull at a 90 degree angle.
  5. Record whether or not sealant in joint maintained adhesion to substrate or not.
  6. Record percentage length of sealant elongation.
  7. Sealant product acceptance shall be based on pass/fail adhesion performance.
- E. Coordination and Pre-Installation Meetings:
1. Coordinate work in this Section with work in related Sections.

#### **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials in the unopened, original containers or unopened packages with manufacturer's name, labels, product identification, color, expiration period, curing time and mixing instructions for multi-component materials.
- B. Storage and Protection: Store materials in a dry secure place at temperatures below 80 degrees F.

#### **1.5 PROJECT/SITE CONDITIONS**

- A. Maintain temperature and humidity conditions as recommended by sealant manufacturer. Apply solvent curing sealants in well ventilated spaces.

#### **1.6 SEQUENCING**

- A. Apply waterproofing, water repellents, and preservative finishes after sealant installation has fully cured.

#### **1.7 WARRANTY**

- A. Provide manufacturer's warranty against material defects, air and water tightness, loss of adhesion, cohesion, and staining as follows:
  1. Silicone sealants – 20 years.
  2. Urethane sealants – 5 years.
  3. Other sealants – 2 years.
- B. Provide installer's warranty against workmanship for 2 years.

**1.8 MAINTENANCE DATA**

- A. Provide cleaning and maintenance information.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Dow Corning Corp.
- B. GE Silicones
- C. Pecora Corp.
- D. Sika Corporation
- E. Tremco Inc.
- F. BASF Corporation – Building Systems
- G. Or accepted equal.

**2.2 SEALANTS**

- A. General:
  - 1. Provide sealants that have been tested and found suitable for the substrates to which it will be applied.
  - 2. Color: As selected by Architect from manufacturer's full range of colors.
- B. Interior Building Sealant: Siliconized acrylic latex sealant; ASTM C834; single component; mildew resistant; paintable.
  - 1. Tremco Inc.                      Tremflex 834.
  - 2. Pecora Corp.                      AC-20 + Silicone.
  - 3. or accepted equal.
- C. Sanitary Sealant (interior joints with nonporous substrates around non-detention ceramic tile, showers, sinks and plumbing fixtures): Mildew resistant silicone sealant; ASTM C920; Type S; Grade NS; Class 25; use NT, G, A, and O; formulated with fungicide.
  - 1. Tremco Inc.                      Tremsil 200 Sanitary.
  - 2. Pecora Corp.                      Pecora 898.
  - 3. Dow Corning Corp.              785 Mildew Resistant
  - 4. GE Silicones                      Sanitary SCS 1700.
  - 5. or accepted equal.

- D. Exterior Perimeter Sealant: Silicone sealant; ASTM C920, Type S; Grade NS; Class 25; use NT, M, G, A, and O. Acceptable products:
1. Tremco Inc. Spectrem 1.
  2. Dow Corning Corp. 790 Silicone Building Sealant.
  3. Pecora Corp. Pecora 890NST.
  4. or accepted equal.
- E. Exterior Perimeter Sealant: Polyurethane sealant; ASTM C920; Type S or M; Grade NS; Class 25; use NT, M, A, G, and O. Acceptable products:
1. Tremco, Inc. Dymeric 240FC.
  2. BASF MasterSeal NP150 Tint Base.
  3. or accepted equal.
- F. Self-Leveling Polyurethane Sealant: ASTM C920; Type M; Grade P; Class 25; use T and M. Acceptable products:
1. Tremco, Inc. THC 900.
  2. Pecora Corp. Urexpan NR-200.
  3. BASF MasterSeal SL 2.
  4. or accepted equal.
- G. Bedding thresholds, glazing secondary seals, curtain wall joints, sheet metal flashing and trims (not exposed to ultraviolet (UV) light): Blend of butyl rubber and polyisobutylene flexible sealant; ASTM C1311. Acceptable products:
1. Tremco, Inc. Butyl Sealant.
  2. Pecora Corp. BA-98 Butyl Rubber Sealant.
  3. or accepted equal.

### **2.3 ACCESSORIES**

- A. Primers: Nonstaining, quick-drying type and consistency recommended by the sealant manufacturer for the particular application.
- B. Bond Breakers: Type and consistency recommended by the sealant manufacturer for the particular application.
- C. Bond Breaker Tape: Self-adhesive, polyethylene tape.
- D. Joint Backing: Non-adhering backing to sealant; nonstaining, compatible with sealant and primer such as round, closed cell polyethylene foam rod; oversized 30 percent to 50 percent larger than joint width. Materials impregnated with oil, bitumen or similar materials are not permitted.

- E. Joint Cleaner: Non-corrosive and nonstaining type, recommended by sealant manufacturer and compatible with joint forming materials.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine job site conditions; verify substrate, surfaces, and joint openings are ready to receive work and field measurements are as shown on drawings, as specified in this Section, and as recommended by manufacturer.
- B. Report unacceptable conditions to Project Manager. Begin installation only when unacceptable conditions have been corrected.

#### **3.2 PREPARATION**

- A. Clean, prepare, and prime joints in accordance with manufacturer's instructions.
- B. Remove loose materials and foreign matter that might impair sealant adhesion. Clean porous materials such as concrete or masonry by grinding, sand or water blast cleaning, mechanical abrading, acid washing or a combination of these methods as required to provide a clean, sound base surface for sealant adhesion.
  - 1. Remove laitance by acid washing, grinding or mechanical abrading.
  - 2. Remove form oils, release agents, chemical retardants, by sand or water blast cleaning.
  - 3. Blow out joints with oil-free compressed air loose particles resulting from grinding, abrading, or blast cleaning prior to sealant application.
  - 4. Do not apply sealant to masonry joints where water repellent or masonry preservative has been applied. Apply water repellents or waterproofing treatments after sealants has fully cured. Coordinate with Section 07 19 19 "Silicone Water Repellents".
- C. Mechanically or chemically clean nonporous surfaces such as metal and glass. Remove temporary protective coatings on metallic surfaces using solvents that leave no residue as recommended by metal surface manufacturer. When masking tape or strippable films are used, remove the tape or film and clean any residual adhesive. Apply and wipe-dry cleaning solvents using clean, lint-free cloths or paper towels, do not allow solvent to air dry without wiping.
- D. Protect elements surrounding the work of this Section from damage or disfiguration.

#### **3.3 APPLICATION**

- A. Apply sealants in accordance with ASTM C1193, manufacturer's instructions, and accepted shop drawings.
- B. Apply acoustical sealants in accordance with ASTM C919, manufacturer's instructions, and accepted shop drawings.
- C. Apply sealant where indicated on the drawings and at all exterior joints and openings in the building envelope that are observable sources of air or water infiltration.
- D. Measure joint dimensions and size materials to achieve required width-to-depth ratios.

Acceptable joint width-to-depth ratios:

Material	Joint Width	Joint Depth	
		Minimum	Maximum
Metal, glass, or other nonporous surfaces.	1/4 inch (minimum)	1/4 inch	1/4 inch
	Over 1/4 inch	1/2 of width	Equal to width
Wood, concrete, masonry, or other porous surfaces.	1/4 inch (minimum)	1/4 inch	1/4 inch
	Over 1/4 inch	1/2 of width	Equal to width
	Over 1/2 to 2 inches	1/2 inch	1/2 inch
	Over 2 inches	As recommended by sealant manufacturer.	

- E. Install joint backing to achieve desired joint width-to-depth ratio. Roll the material into the joint to avoid lengthwise stretching. Do not twist or braid rod stock.
- F. Install bond breaker where joint backing is not used.
- G. Prime surfaces to receive joint sealant with primer recommended by sealant manufacturer.
- H. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges. Apply masking tape where required to protect adjacent surfaces from sealant application.
- I. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- J. Tool joints concave. Use dry tooling method.

**3.4 CLEANING AND REPAIRING**

- A. Immediately clean work under provisions of Section 01 70 00 "Execution and Closeout Requirements".
- B. Clean adjacent soiled surfaces. Use a solvent or cleaning agent as recommended by the sealant manufacturer. Remove any masking tape immediately after tooling joints, leaving finished work in neat and clean condition.
- C. Repair or replace defaced or disfigured caused by work of this Section.

**3.5 PROTECTION OF FINISHED WORK**

- A. Protect finished installation under provisions of Section 01 50 00 "Temporary Facilities and Controls".
- B. Protect sealant until cured.
- C. Do not paint sealants until sealant is fully cured.

- D. Do not paint silicone sealant.
- E. Protect joint sealants from contact with contaminating substances and from damage. Cut out, remove and replace contaminated or damaged sealants, immediately, so that they are without contamination or damage at time of substantial completion

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Non-Detention Hollow metal doors and frames.

**1.2 SUBMITTALS**

- A. Shop Drawings: Include illustrations and schedule of finish hardware, door and frame size, type, material, fire ratings, construction, finishing, anchoring, glazing, louvers, accessories, and preparation for installing hardware.
  - 1. Method of attachment of frames to structure shall be reviewed by Architect for acceptance or rejection.
  - 2. Details of conduit and preparations for power, signal, and control systems.
- B. Templates: Furnish hardware templates to fabricator of frames to be factory prepared for installation of hardware.
- C. Submit product data for type of metal primer proposed for use.

**1.3 DEFINITIONS**

- A. Minimum Thickness: Minimum thickness of base metal without coatings.
- B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

**1.4 QUALITY ASSURANCE**

- A. Steel door and frame manufacturer shall be SDI certified.
- B. Provide doors and frames complying with ANSI A250.8, ANSI/NAAMM-HMMA 861, and as specified herein.

**1.5 REGULATORY REQUIREMENTS**

- A. Fire-Rated Doors and Frames: Provide doors and frames complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
  - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
  - 2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 degrees F above ambient after thirty minutes of standard fire-test exposure.
- B. Testing of Fire-Rated Door and Frame Assembly: Conform to applicable requirements of NFPA 252 or UL 10C.



- C. Doors and Frames for Smoke-Control Door Assemblies: Comply with applicable requirements of NFPA 105 or UL 1784.
- D. Fire-Rated Door and Frame Labels: All fire rated doors and frames shall have metal labels (including "S" labels) permanently fastened to the jamb indicating the fire rating and Testing Agency name.
  - 1. Do not apply primer or paint over fire rating labels.
- E. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.

#### **1.6 DELIVERY, STORAGE AND HANDLING**

- A. Deliver all materials under protective cover and store in upright position within a dry enclosed space in a manner that will prevent rust and damage. Do not create a humidity chamber by using a plastic or canvas shelter that is not adequately vented.
- B. Deliver fully-welded frames with two removable spreader bars across bottom of door frames, tack welded to jambs and mullions.

#### **1.7 PROJECT CONDITIONS**

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

#### **1.8 COORDINATION**

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

### **PART 2 PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers, Hollow Metal Doors and Frames:
  - 1. Ceco Door Products
  - 2. Curries Company
  - 3. Steelcraft
  - 4. Door Components Inc.
- B. Or accepted equal.

#### **2.2 MATERIALS**

- A. Cold-Rolled Steel Sheets for Doors and Frames: Commercial Steel (CS), Type B, complying

with ASTM A1008/A1008M.

1. Use cold-rolled steel for door frames and exposed-to-view surfaces.
- B. Hot-Rolled Steel Sheets and Strip for use at Door Frames: Commercial Steel (CS), Type B; complying with ASTM A1011/A1011M.
1. Steel shall be free of mill scales, pitting, or surface defects; pickled and oiled.
  2. Use hot-rolled steel for reinforcement and concealed components only.
- C. Factory-Applied Primer: Manufacturer's standard primer, thickness: two mils minimum, and compatible with ferrous and galvanized metal primers.

### 2.3 STANDARD HOLLOW METAL DOOR FABRICATION

- A. General: Fabricate to sizes shown, providing necessary clearances and bevels to permit operation without binding. Doors shall be free from warp, wave, buckle or other defect. Doors shall be 1-3/4 inches thick, unless otherwise indicated on Drawings.
- B. Flush Door Construction: Door shall be Grade III, Model 2, fabricated with face sheets of 16 gauge steel in accordance with ANSI/SDI A250.8 and galvanized to ASTM A653/A653M A60 at exterior locations and interior wet locations. Door shall be flush with edge seams, weld filled and ground smooth. Bevel lock edge 1/8 inch in 2 inches. Door shall be provided with 16 gauge steel top flush cap welded and ground smooth, and bottom inverted 14 gauge steel channels welded within the door. Door shall be reinforced, stiffened and sound deadened with impregnated kraft honeycomb core completely filling door cavity, and laminated to the inside faces of panels.
1. Exterior doors shall be insulated with an expanded polystyrene or polyurethane core, or as standard with manufacturer. Completely fill door cavity with insulation. Expanded polystyrene to be ASTM C578, Type 1 or Type 2, with minimum one pound per cubic foot density.
- C. Preparation of Hardware: Per ANSI/SDI A250.6, door shall be mortised, reinforced, drilled, and tapped at the factory from templates for all mortise hardware listed in the Hardware Schedule. Door shall be reinforced for surface applied hardware such as closers, checks, escutcheons, and kick plates; drilling and tapping to be done in the field by door installer. Reinforcement to be 12 gauge for locksets and latch sets, and 14-gauge for surface applied hardware, except use 3/16-inch-thick plate for butt hinges. Door shall be provided with reinforcing unit as recommended by lock manufacturer.

### 2.4 STANDARD HOLLOW METAL FRAME FABRICATION

- A. General:
1. Provide fully-welded frames.
  2. Hollow metal frames shall be formed to shapes and sizes shown.
- B. Full Profile Welded Frames: Head and jamb splices shall be fabricated with mitered, coped and continuously welded inside and outside corners and be finished on the outside face to present a smooth surface for painting.
- C. Frames shall be fabricated from 16-gauge steel at interior locations and 16-gauge stainless

steel at exterior locations and shall be designed with integral stop and trim. All corners shall be reinforced with 18 gauge "L" shaped reinforcements welded on the inside face of the frame.

1. Provide steel reinforcement at steel frames.
  2. Provide stainless steel reinforcement at stainless steel frames.
- D. Reinforce frames wider than 48 inches with roll formed channels fitted tightly into frame head, flush with top.
1. Provide steel channels at steel frames.
  2. Provide stainless steel channels at stainless steel frames.
- E. Frames shall be hot-dipped galvanized to ASTM A653/A653M G90 at interior wet locations.
- F. Preparation for Hardware: Frame shall be prepared at the factory for all hardware using templates furnished by hardware supplier. Locations of miscellaneous hardware shall conform to the recommendations for the Door & Hardware Institute. Mortise, reinforce, drill and tap for mortise type hardware. Reinforce frames for surface applied hardware; drilling and tapping to be done in the field by door installer.
1. Hardware cutouts shall have steel plate reinforcements with tapped holes fillet welded to frame on all four sides of the plate. Fillet welds shall be minimum 1 inch long. Reinforcement shall include 3/16-inch butt reinforcement; 12-gauge lock strike; 14 gauge for surface applied items.
    - a. Provide stainless steel reinforcement at stainless steel frames in the locations and thickness specified above.
  2. Provide strike stops at frames to receive metal doors with holes for three rubber door silencers. On double door frames, provide for two silencers per door at head. Omit holes at frames to receive unitized gasketing.
- G. Where the solid grouting of frames is required, provide top openings and jamb to mullion openings to facilitate the solid grouting of frames.

## **2.5 BORROWED LIGHTS (INTERIOR WINDOWS, FIXED)**

- A. Interior Window Units: Furnish shop assembled and welded units for fixed windows, fabricated to the designs and dimensions indicated. Provide metal glazing stops and mouldings of same gauge as frame on secure side of window for field assembly with countersunk oval head self-tapping screws spaced not over 16 inches on center. Frames shall be complete with all corners welded, ground smooth, and provided with anchors.

## **2.6 ANCHORS**

- A. Frame shall be anchored to structure with anchors appropriate for use with type of adjacent construction. Anchorage shall securely fasten frames to wall construction involved. Provide a minimum three anchors, including one adjustable floor anchor, at each door jamb. Frames taller than eight feet in height will require additional anchors at each jamb. Anchors shall be minimum 16-gauge steel and shall provide stiffness and rigidity to keep frames square, in

accurate position without twisting, buckling, or warping. Fasteners to framing substrate shall be the following minimums; greater as required by the frame manufacturer or as conditions warrant:

1. Metal Framing: Two #10 self-tapping sheet metal screws per anchor, length as required; fastener to penetrate a minimum of 1/4 inch into framing member.
2. Masonry: 3/8 inch diameter loop anchors welded to the 10 gauge steel plates. Refer to Drawings for size, location, and quantity.

## **2.7 PRIMING**

- A. Doors and frames shall be leveled and welds ground smooth. Apply mineral filler to eliminate weld scars and other blemishes.
- B. Shop Priming: All surfaces shall be cleaned, phosphatized, and given one coat of baked-on rust-inhibiting primer in accordance with the Steel Door Institute Specification "Test Procedure and Acceptance Criteria for Primer Painted Steel Doors and Frames".
  1. Do not prime paint over fire-rated door and frame labels.

## **2.8 ACCESSORIES**

- A. Glazing Stops: LoPro by Anemostat or Slimline by Air Louvers, Inc. Galvanized steel; mitered corners; prepared for countersink style screws. Sizes as indicated on Drawings. Install glazing stop fasteners on the non-secure side of doors. Finish shall be factory primed to receive site paint finish, color as selected by Architect.
  1. At fire-rated assemblies, fire-rating of glazing stops shall match fire-rating of opening. Fire-rated glazing stops shall bear the listing mark of Underwriters Laboratories and/or Warnock Hersey, and shall be visible without removal of the frame from the door.
- B. Non-Rated Door Louvers: AFDL by Anemostat or Model 800 A1 by Air Louvers, Inc. Fabricate from galvanized cold rolled steel sheet. Frame shall be 18 gauge and blades shall be 22 gauge. Permanent interlocking construction shall be used to secure blades to frame on stationary louvers. Frames shall have mitered and flush welded corners. Factory install screens, aluminum wire mesh. Louvers shall have fifty percent free area minimum; sizes as indicated on Drawings. Finish shall be factory primed to receive site paint finish, color as selected by Architect.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that opening sizes and tolerances are acceptable.

### **3.2 INSTALLATION**

- A. Install doors and frames in accordance with ANSI A250.8, and ANSI/NAAMM-HMMA 861, and UL 752, as applicable.

- B. Set frames level and plumb, and brace adequately to prevent damage or distortion. Secure to structure with minimum of three anchors at each jamb. Field joints shall be welded, body puttied and ground smooth.
  - 1. Removable Spreaders: Wherever possible, leave frame spreaders intact until frames are set perfectly square and plumb, and anchors are securely attached.
- C. Door Installation in Hollow Metal Frames: Fit hollow metal and wood doors accurately in frames.
- D. Door frames that are not filled with grout (in CMU walls) shall have the inside filled with **fiberglass** acoustic insulation. Do not compress insulation.

### 3.3 ERECTION TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

### 3.4 ADJUST AND CLEAN

- A. Prime Coat Touch-Up: Immediately after erection, sand smooth all rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer. Touch-up shall not be obvious.
- B. Cleaning and Finishing: Upon completion of the work, clean all exposed surfaces, removing any discoloration or foreign matter, and touch up all abraded or cut areas and exposed edges with finishing material recommended by the manufacturer. Touch-up of finish shall not be obvious.
- C. Final Adjustments: Adjust door for smooth and balanced door movement. Check and readjust operating finish hardware in hollow metal work immediately prior to final inspection. Leave work in complete and proper operating condition.
- D. Defective Work: Remove and replace defective work, including doors and frames which are warped, bowed or otherwise damaged, as directed by Architect, at no cost to Owner.
- E. Protection: Protect installed hollow metal work against damage from other construction work.

### 3.5 CLEAN-UP

- A. Upon completion of the work of this Section, remove all excess materials, rubbish, and debris from the premises.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Rated and Non-Rated Flush Plastic- Laminate Wood Doors.

**1.2 SUBMITTALS**

- A. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, fire ratings, swings, undercuts required, special beveling, special blocking for hardware, and identify cutouts for glazing and louvers.
- B. Product Data: Indicate door core materials and construction, veneer species and cut, type and characteristics, factory machining criteria, and factory finishing criteria.
- C. Samples: Submit three sets of three samples each of door laminate, 8 inches x 8 inches in size.

**1.3 QUALITY ASSURANCE**

- A. Single Source Responsibility: All doors specified in this Section shall be manufactured and provided by a single manufacturer to ensure door compatibility and quality.
- B. Perform work in accordance with WI/AWMAC, Section 9, Custom Grade.
- C. Other requirements shall conform to WDMA I.S. 1A-04 as follows:

Performance Attribute	Duty Level
	Extra Heavy Duty
Adhesive Bond Durability WDMA TM-6, 1988	Type I
Cycle Slam WDMA TM-7, 1990	1, 000,000 cycles
Hinge-Loading WDMA TM-8, 1990	550 pounds
Screwholding WDMA TM-10, 1990	
Door Face Unblocked	550 pounds
Door Face (with optional blocking)	700 pounds
Vertical Door Edge	550 pounds
Horizontal Door Edge (applies when hardware attached)	300 pounds
Telegraph WDMA T-1	Maximum 0.010 inch per 3-inch span
Warp Tolerance WDMA T-2	Maximum 0.25 inch per 3 foot 6 inches by 7 foot door section
Squareness WDMA T-3	Diagonal Variance 0.125 inch

**1.4 REGULATORY REQUIREMENTS**

- A. Fire-Rated Wood Doors: Doors complying with California Building Code (CBC), and NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, as

applicable.

- B. Fire Door Construction: Conform to NFPA 252.
- C. Fire-Rated Doors: All fire rated doors shall have metal labels (including "S" labels) permanently fastened to the hinge stile indicating the fire rating and Testing Agency name. Do not apply primer or paint over fire rating labels.

### **1.5 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section.

### **1.6 DELIVERY, STORAGE AND HANDLING**

- A. Accept doors on site in manufacturer's packaging. Inspect for damage.
- B. Comply with requirements in ANSI/WDMA I.S.1A: How to store, handle, finish, install and maintain wood doors.
- C. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to Owner.
- D. Store flat on a level surface in a dry, well-ventilated building. Cover to keep clean but allow air circulation.
- E. Handle with clean gloves and do not drag doors across one another or across other surfaces.
- F. Do not subject door to abnormal heat, dryness or humidity.
- G. Deliver in clean trucks and, in wet weather, under cover.

### **1.7 FIELD MEASUREMENTS**

- A. Verify that field measurements are as indicated on shop drawings.

### **1.8 COORDINATION**

- A. Coordinate the work with door opening construction, doorframe, door hardware, door glazing, and door louver installation.

### **1.9 WARRANTY**

- A. Provide warranty to the following term:
  - 1. Interior Solid Core Doors: Lifetime.
- B. Include coverage for delamination of veneer, warping or twisting (not to exceed 1/4" in any face including diagonal) or other defects. Warranty shall cover replacement of door plus costs of hanging and finishing.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers:
1. Western Oregon Door, Inc.
  2. Marshfield Door Systems
  3. Mohawk Flush Doors, Inc.
  4. VT Industries.
  5. Graham.
  6. Or accepted equal.

## **2.2 DOOR CONSTRUCTION**

- A. Construction
1. 5 ply hot press construction or 7 ply cold press construction.
  2. Core glue bonded to stiles and rails then thickness sanded prior to door lay-up. No mechanical fasteners may be used.
  3. Institutional solid particle board core.
  4. SLM edges with veneer covering and SLM blocking for hardware.
  5. Provide doors made with adhesives and composite wood products that do not contain urea-formaldehyde resins.
- B. Fire-Rated Doors: 1-3/4" thick, match non-rated door appearance; comply with UBC Standard 7-2; UL or Warnock Hersey rated.
1. Labels: Place fire rating labels where visible when doors are installed, in opened position.
  2. Fire Ratings: Refer to Drawings for fire rating requirements.
  3. Core: Use wood core construction for 20 minute rated flush doors, mineral core permitted for longer ratings
  4. Temperature Rise Rating: Provide doors with maximum 450°F Temperature Rise Rating in 30 minute fire exposure period at doors into exit enclosures.
- C. Plastic Laminate Faces:
1. Decorative 3-ply laminate face from the following manufacturers: Wilsonart or Formica Nevamar. Basis of Design: Wilsonart, see Finish Schedule Legend for color selection.
  2. High pressure decorative laminate general purpose grade 50 (GP50 - .050" thick). Complying with NEMA standard LD-3.
  3. Apply faces prior to edges, ease all corners.



### **2.3 ACCESSORIES**

- A. Glazing Stops: LoPro by Anemostat or Slimline by Air Louvers, Inc. Steel; mitered corners; prepared for countersink style screws. Sizes as indicated on Drawings. Install glazing stop fasteners on the non-secure side of doors. Factory paint finish in custom color as selected by Architect.
  - 1. At fire-rated assemblies, fire-rating of glazing stops shall match fire-rating of opening. Fire-rated glazing stops shall bear the listing mark of Underwriters Laboratories and/or Warnock Hersey, and shall be visible without removal of the frame from the door.
- B. Non-Rated Door Louvers: Anemostat Model ADFL or Air Louver. Fabricate from cold rolled steel sheet. Frame shall be 18 gauge and blades shall be 22 gauge. Permanent interlocking construction shall be used to secure blades to frame on fixed or stationary louvers. All frames shall have mitered and flush welded corners. Louvers shall have fifty percent free air minimum; size as indicated on Drawings.

### **2.4 FABRICATION**

- A. Fabricate non-rated doors in accordance with WI/AWMAC North American Architectural Woodwork Standards requirements.
- B. Provide blocking at top of door for closer for attachment with screws.
- C. Bond edge banding to cores.
- D. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.
- E. Undercut doors.
- F. Glass Cutouts: Provide cutouts for glass of size and shape indicated.
- G. Louver Cutouts: Provide cutouts for louvers of size and shape indicated.
- H. Factory seal top and bottom rails before shipment.
- I. Bevel both stiles 1/8 inch in 2 inches (3 degree bevel) and undersize doors 1/4 inch in width so that they swing freely and do not hinge bind.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify frame opening conditions.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

### **3.2 INSTALLATION**

- A. Install rated and non-rated doors in accordance with WI/AWMAC Section 9 requirements,

and UL or Intertek Testing Services (ITS) requirements.

- B. Pre-adjust door height, supply doors with factory undercut.
- C. Where required, trim non-rated door width by cutting equally on both jamb edges.
- D. Where required, trim door height by cutting bottom edge to a maximum of 3/8 inch above finished floor or threshold.
- E. Pilot drill screw and bolt holes.
- F. Machine cut for hardware. Core for handsets and cylinders.

### **3.3 INSTALLATION TOLERANCES**

- A. Maximum Diagonal Distortion (Warp): 1/4-inch measured with straight edge or taut string, corner to corner, over an imaginary 36-inch x 84-inch surface area.
- B. Maximum Vertical Distortion (Bow): 1/4 inch measured with straight edge or taut string, top to bottom, over an imaginary 36-inch x 84-inch surface area.

### **3.4 ADJUSTING**

- A. Adjust door for smooth and balanced door movement, and wipe clean.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Aluminum storefront system.
- B. Accessories.

**1.2 SUBMITTALS**

- A. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners and glass.
- C. Submit two samples, 12" x 12" minimum in size, illustrating pre-finished aluminum surface, EPDM or neoprene gasketing and glass and glazing materials.
- D. Provide windload and deadload charts to verify that the system meets all design loads and meets the minimum PSF required at the location of the project.

**1.3 SYSTEM DESCRIPTION**

- A. Aluminum storefront system includes shop fabricated, factory pre-finished tubular aluminum sections and doors, glass, related flashings, anchorage and attachment devices.

**1.4 PERFORMANCE REQUIREMENTS**

- A. Air leakage of window system shall not exceed 0.3 cubic feet per minute per square foot of window area at a pressure differential of 1.57 pounds per square foot when tested according to NFRC 400 or ASTM E283.
- B. Air leakage of each single entrance door shall not exceed 0.3 cubic feet per minute per square foot of door area at a pressure differential of 1.57 pounds per square foot when tested according to NFRC 400 or ASTM E283.
- C. Air leakage of each set of double entrance doors shall not exceed 1.0 cubic feet per minute per square foot of door area at a pressure differential of 1.57 pounds per square foot when tested according to NFRC 400 or ASTM E283.

**1.5 REGULATORY REQUIREMENTS**

- A. Window systems and exterior doors shall be certified under provisions of the California Energy Code.

**1.6 QUALITY ASSURANCE**

- A. Perform Work in accordance with AAMA SFM-1.
- B. Conform to requirements of ANSI A117.1.
- C. These requirements establish standards of design and quality for material, construction, and

workmanship. When substitute products of equal quality are to be submitted, contractor shall submit for consideration supporting technical literature, samples, drawings, and performance data so these items may be evaluated.

- D. The approved manufacturer's recommended installation procedures will become the basis for inspecting or rejecting actual installation procedures used on the work.

### **1.7 QUALIFICATIONS**

- A. Manufacturer and Installer: Company specializing in manufacturing aluminum glazing systems.

### **1.8 DELIVERY, STORAGE AND HANDLING**

- A. Protect pre-finished aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

### **1.9 WARRANTIES**

- A. Storefront System:
  - 1. Provide written warranty in form acceptable to Owner jointly signed by manufacturer, installer and Contractor warranting work to be watertight, free from defective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components which fail within one year from date of Project Completion.
  - 2. Warranty shall cover following:
    - a. Complete watertight and airtight system installation within specified tolerances.
    - b. System is structurally sound and free from distortion.
- B. Finish: Finished coating system specified in this Section, as applied over aluminum extrusions, shall be warranted for a period of ten years from date of Project Completion.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Basis of Design: Oldcastle Building Envelope, Product: Series 3000XT thermally broken storefront, center loaded, with Series 375 doors.
- B. Kawneer Company, Inc.
- C. United States Aluminum.
- D. Arcadia
- E. Or accepted equal.

### **2.2 MATERIALS**

- A. Extruded Aluminum: ASTM B221; 6063 alloy, T5 temper. Wall thickness shall provide structural strength to meet specified performance requirements.
- B. Sheet Aluminum: ASTM B209.
- C. Fasteners: Stainless steel.

- D. Perimeter Anchors: Stainless steel, or plated steel providing the steel is properly isolated from the aluminum.

### **2.3 DOORS**

- A. Doors: Medium stile door. Vertical stile and top rail systems on all door frame systems shall be 4-1/4" wide, and bottom rail shall be 10" high. Corner construction shall consist of mechanical clip fastening, SIGMA deep penetration and minimum 1-1/8" long fillet welds. Glazing stops shall be snap-in type with EPDM flashing gaskets.
  - 1. Hardware: Hardware shall be installed at the factory prior to shipment.
  - 2. Thresholds: Thresholds shall be one piece thresholds in a new bed of non-shrink grout. Threshold shall set no higher than 1/2" from the lowest floor surface. When complete, threshold shall be accessible.
- B. Weather-strip: Door manufacturer's standard felt insert strip designed into door system along perimeter door edges.

### **2.4 SECACCESSORIES**

- A. Flashings and Closures: 0.050" thick aluminum, finish as selected to match mullion sections where exposed.

### **2.5 GLASS AND GLAZING MATERIALS**

- A. Glass and Glazing Materials: As specified in Section 08 81 00 "Glass Glazing".
- B. Glazing gaskets and seals used for aluminum work shall be an integrated glazing system designed by the aluminum work manufacturer to produce a watertight assembly, and shall be physically and chemically compatible with each other and with adjacent materials.
  - 1. Neoprene and EPDM materials shall not come in contact with silicone sealant materials.
  - 2. Gaskets shall be designed, when in final compression form, to be compressed a minimum of 25% and a maximum of 40%, and to exert a pressure of between 4 lbs. and 10 lbs. pressure per linear inch.
  - 3. All side light and transom glass shall be set with the same type and size of glazing gasket material.
- C. Contractor shall provide and set lead blocking for all window systems installed. Each glass panel supplied shall display a factory mark certifying each glass panel is manufactured of tempered glass. Plate glass and laminated glass will not be acceptable.

### **2.6 SEALANT MATERIALS**

- A. Sealant and Backing Materials: As specified in Section 07 92 00 "Joint Sealants".

### **2.7 FABRICATION**

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof. Sealant will not be allowed at exposed joints.
- C. Prepare components to receive anchor devices. Fabricate anchors.
- D. Arrange fasteners and attachments to conceal from view.

- E. Prepare components with internal reinforcement of 1/4 inch thick galvanized steel mounting backing plates for door hardware and hinge hardware as per ASTM A36.
- F. Exposed work shall be carefully matched to produce continuity of line, design and finish. Joints in exposed work, unless otherwise shown or required for thermal movement, shall be accurately fitted, rigidly secured with hairline contacts and sealed watertight.
- G. Removable members such as glass stops shall be extruded and securely engaged into adjacent components as indicated by product manufacturer.
- H. Face clearances between glass and stop shall comply with code requirements and glass manufacturer's recommendations.
- I. All fasteners shall be of sufficient strength to support both horizontal wind load and vertical dead load, with a Factor of Safety of 1.5. They shall be spaced and be sized to develop the maximum strength of the members they secure or support. Washers, where required, shall be of the same material as the fastener. Unless otherwise shown or approved, fastening systems shall be concealed.
- J. Sealants, gaskets, setting blacks, tapes and separators, where used, shall be physically and chemically compatible with each other and with adjacent materials. Items shall be installed so that they will not become dislodged during or after assembly of units.

## **2.8 SPECIAL REQUIREMENTS**

- A. Dissimilar Materials Protection: Use chromate gasketing to separate aluminum surfaces in contact with other metals, plaster or concrete, or heavy coat of alkali resistant bituminous paint. Aluminum need not be separated from stainless or galvanized steel.

## **2.9 FINISHES**

- A. All aluminum extrusions shall have Anodized finish, to be selected from manufacturer's full range of standard colors.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify dimensions, tolerances and method of attachment with other work.
- B. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

### **3.2 INSTALLATION**

- A. Install window wall system in accordance with manufacturer's instructions and AAMA – Metal Curtain Wall, Window, Storefront and Entrance – Guide Specifications Manual. Manufacturer shall provide installation instructions and installer shall comply with these instructions.
- B. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- C. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

- D. Provide alignment attachments and shims to permanently fasten system to building structure.
- E. Frames shall be anchored to structure with concealed fasteners appropriate for use with type of adjacent construction. Fasteners shall securely fasten frames to wall construction involved. Fasteners shall provide stiffness and rigidity to keep frames square, in accurate position without twisting, buckling or warping. Fasteners to framing substrate shall be the following minimums; greater as required by the window wall manufacturer or as conditions warrant:
  - 1. Concrete/Masonry: Hilti KB3 wedge anchors or accepted equal at 12" on center.
- F. Install flashings and sealant.
- G. Set thresholds in bed of mastic and secure.
- H. Separate dissimilar materials at contact points, including metal in contact with masonry surfaces, with bituminous paint in conformance with ASTM D1187 or preformed separators to prevent contact or corrosion.

### **3.3 TOLERANCES**

- A. Maximum Variation from Plumb: 0.06" every 3' non-cumulative or 0.06" per 10', whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32".

### **3.4 CLEARANCES**

- A. Top and sides of door shall have a minimum of 1/16" to a maximum of 1/8" clearance.
- B. Bottom of door and threshold shall have a minimum of 1/8" to a maximum of 1/4" clearance.
- C. All doorframes shall be measured with the minimum clearance of exact size or a maximum of 1/4" overall clearance to fit sides of opening to 1/8" at top of opening.
- D. All installation clearances for door frame and door in either newly constructed openings or as replacement units for existing openings will by strictly adhered to. No other minimum or maximum clearances will be acceptable and will prove cause for total replacement of the opening at the sole expense to the Contractor.
- E. Mortise hardware shall fit flush with finished trim moldings and applied directly to recessed sidewalls of the door and or frame system. Cutouts in door or frame moldings shall require separate screw applied tabs or straps on which to mount concealed hardware per manufacturer's templates as detailed on the drawings. Where shims and spaces are required for finished appearance, they shall provide full and solid bearing for the hardware.

### **3.5 ADJUSTING**

- A. Adjust operating hardware for smooth operation.

### **3.6 CLEANING**

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean

wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

- C. Remove excess sealant by method acceptable to sealant manufacturer.

**END OF SECTION**



**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Aluminum, medium-duty commercial sliding service windows as indicated in drawings.

**1.2 SUBMITTALS**

- A. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work and installation requirements.
- B. Product Data: Provide component dimensions, anchorage, fasteners, and glass.
- C. Submit two samples 6-inch by 6-inch size illustrating window frame section, mullion section, pre-finished aluminum surfaces and glazing materials.
- D. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

**1.3 QUALITY ASSURANCE**

- A. Perform work in accordance with GANA Glazing Manual and Installer's Qualifications: The installation shall be performed only by an installation firm with a minimum of five years' experience in this business. All work shall be performed by qualified mechanics that specialize in security glazing installation.
- B. Manufacturer's experience: Manufacturer shall have a minimum of 5 years' experience, with documented installation of identical product to that specified.

**1.4 DELIVERY, STORAGE AND HANDLING**

- A. Deliver glazing crated to provide protection during transit and job storage with manufacturer's labels intact and store in protected areas. Keep glazing free from contamination by materials capable of staining glazing.
- B. Inspect windows upon delivery for damage. Unless minor defects can be made to meet the Architect's specifications and satisfaction, damaged parts should be removed and replaced.
- C. Store windows at building site under cover in dry location.
- D. Deliver glazing sealants, tapes, accessories, and specialty items in manufacturer's unopened, labeled packaging.

**1.5 PROJECT CONDITIONS**

- A. Field measurements: Check opening by accurate field measurement before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Basis of Design: SW Series, Aluminum Frame Sliding Service Window as manufactured by

C.R. Laurence Co., Inc.

- B. Or accepted equal.

## **2.2 MATERIALS**

- A. Frames: Aluminum frame modules shall be constructed of 6063-T5 extruded aluminum. Window glides on top-hung nylon slides. Poly-pile weather stripping and slide locks. Overall frame sizes are to be in accordance with the contract drawings.
- B. Finish: All aluminum to be clear anodized (or as specified by Architect).
- C. Glazing: The glazing is 1/8" in thickness and shall be tempered.

## **2.3 SEALANTS**

- A. Material: Silicone sealants in conformance with ASTM C920.
- B. Acceptable Manufacturers and Products:
  - 1. Exterior Surfaces:
    - a. Tremco, Product: Spectrem 2.
    - b. GE, Product: 2200.
    - c. Or Architect approved substitute.
  - 2. Interior Surfaces – Glazing to Hollow Metal Frame:
    - a. Pecora, Product: Dynaflex SC Security Sealant.
    - b. Or Architect approved substitute.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify prepared openings for adequacy to receive glazing.
- B. Verify openings for glazing are correctly sized and within tolerance.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

### **3.2 INSTALLATION**

- A. Clean contact surfaces with solvent and wipe dry.
- B. Apply primer or sealer to joint surfaces wherever recommended by sealant manufacturer.
- C. Check that glazing is free of edge damage and surface defects.
- D. Install window in accordance with manufacturer's printed instructions and recommendations. Replace damaged units with new units.
- E. Protect glazing from edge damage at all times during handling, installation, and subsequent operation of the glazed components of the work.
- F. Glazing channel dimensions are intended to provide for necessary bite on the glazing, minimum edge clearance and adequate sealant thicknesses, with reasonable tolerances.

The glazier is responsible for correct glazing size for each opening, within the tolerances and necessary dimensions established and for verifying the dimensions of the glazing stops.

- G. Sealant shall be installed in a neat, flush, professional manner. Sealant not in compliance shall be completely removed and replaced at no cost to County.
- H. Leave entire work in neat, orderly, clean condition at time of Project Completion.

### **3.3 CLEANING**

- A. Clean frame and glazing surfaces after installation, complying with requirements contained in the manufacturer's instructions. Remove excess glazing sealant compounds, dirt or other substances.

### **3.4 PROTECTION**

- A. Institute protective measures required throughout the remainder of the construction period to ensure that all the windows do not incur any damage or deterioration, other than normal weathering, at the time of acceptance.

**END OF SECTION**

**1.1 PART 1 - GENERAL**

**1.2 SUMMARY**

- A. Section Includes: Provide hardware for hollow metal, aluminum, and wood doors.

**1.3 QUALITY ASSURANCE**

- A. Access for Persons with Disabilities: Comply with California Code of Regulations, Title 24, and Americans with Disabilities Act Accessibility Guidelines (ADAAG).
- B. Supplier: Recognized builders' hardware supplier with minimum five years successful experience in scheduling and furnishing hardware; factory-authorized to distribute specified hardware.
1. Provide services of architectural hardware consultant to supervise hardware supply, as directed.
  2. Coordinate work of this Section with others directly affected.
  3. Send templates within 10 days of hardware schedule approval.
- C. Products: Provide each type of hardware (hinges, pivots, locksets, latchsets, closers, trim) from single manufacturer unless otherwise indicated in Hardware Schedule.
- D. Existing hardware that is to be removed and re-used is to be maintained in the current condition. Any existing hardware that is damaged during construction is to be replaced.

**1.4 REFERENCES**

- A. ANSI A115 and A115W Series: Door and Frame Preparation Standards.
- B. ANSI A156.1 through A156.20: Standards for various hardware items.
- C. National Fire Protection Association: NFPA 80, 101,105.
- D. California Code of Regulations: Title 24, Part 2, California Building Code.
- E. Americans with Disabilities Act Accessibility Guidelines (ADAAG).

**1.5 SUBMITTALS**

- A. Hardware Schedule: Prepare a vertical schedule of hardware:
1. Door numbers must be in numerical sequence.
  2. List each opening, door size, door hand, door and frame material, description of to and from, manufacturer's numbers, and finish.
  3. Hardware supplier shall retype schedule when changes occur during the project and supply new schedules, at no additional expense.
- B. Shop Drawings: Indicate locations and mounting heights of hardware.

1. Supply templates to door and frame manufacturers for proper and accurate sizing and locations of cut-outs for hardware.
- C. Product Data: Submit catalog cuts for each type of hardware.
  1. Keying Schedule: Coordinate with the Architect.

#### **1.6 KEYING CONFERENCE**

- A. Upon receipt of approved Hardware Schedule, architectural hardware consultant shall attend keying conference with Owner and Architect.

#### **1.7 OPERATION AND MAINTENANCE DATA**

- A. Provide manufacturer's parts list and maintenance instructions for each type of hardware supplied and necessary wrenches and tools required for proper maintenance of hardware.

#### **1.8 DELIVERY, STORAGE AND HANDLING**

- A. Deliver hardware in manufacturer's original packages, marked for intended opening and use.
- B. Pack complete with necessary screws, bolts, keys, instructions, and installation template, if necessary, for spotting mortising tools.
- C. Upon delivery, furnish complete list of hardware for checking, clearly marked to correspond with marking on each package.
  1. Review list for completeness and accuracy.

#### **1.9 WARRANTY**

- A. Provide 1-year warranty covering products and workmanship. Warranty period for closers shall be 10 years.

#### **1.10 MAINTENANCE MATERIALS**

- A. Contractor will provide the owner with all wrenches and tools which were included with hardware including extra screws.

#### **1.11 PART 2 - PRODUCTS**

#### **1.12 MATERIALS**

- A. General: Provide complete hardware with accessories as required for doors and applications indicated.
- B. Acceptable Manufacturers: Provide manufacturers specified and manufacturers listed in Hardware Schedule, with references to catalog numbers and designations.
- C. Templates: Furnish templates or physical hardware items to manufacturers concerned sufficiently in advance to avoid delay in Work.
- D. Reinforcing Units: Furnished by door manufacturer, coordinated by hardware manufacturer.
- E. Fasteners: Furnish as recommended by manufacturer and as required to install secure hardware.

1. Finish: Match hardware.
  2. Furnish screws for items applied on gypsum board sufficiently long to provide solid connection to framing or backing
- F. Electrical and Mechanical: Make provisions and coordinate requirements for mechanical and electrical devices in connection with hardware.

### **1.13 HARDWARE ITEMS**

- A. Review Drawings for hardware group locations and door types; where not fully covered in Hardware Schedule, comply with following general requirements; inform the owner where conflicts occur.
1. Provide hardware items with accessories complete to function as intended.
- B. Hinges and Butts: ANSI A156.1; comply with following unless otherwise indicated.
1. Acceptable Manufacturers:
    - a. Ives.
    - b. Stanley Hardware Division of Stanley Works. (Hardware Schedule symbol: "ST").
    - c. C. McKinney
    - d. Or accepted equal.
  2. Provide minimum 3 hinges to 90" high, 4 hinges to 120" high for each door leaf, unless otherwise indicated.
  3. Provide nonferrous butts with non-removable pins at exterior and locked out-swinging doors, non-rising at interior doors; stainless steel where labeled; steel butts at labeled interior doors.
  4. Provide ball bearing or oilite bearing hinges at doors with closers.
  5. Tips: Flat button tips with matching plug.
- C. Locking Devices: Provide of metal matching specified finish; interior parts of steel and zinc-dichromate plating, to resist rusting and corrosion; do not supply plastic, die-cast, or aluminum mechanisms.
1. Acceptable Manufacturers:
    - a. Sargent
    - b. Schlage Lock Co.
    - c. Or accepted equal.
  2. Type:
    - a. Mortise Locksets: ANSI A156.13, Series 1000, Grade 1, Mortise Type with 6 pin tumbler cylinders, except where otherwise indicated in Hardware Schedule.

- b. Cylindrical Locksets: ANSI A156.2, Series 4000, Grade 1, Bored Type (cylindrical) with 6 pin tumbler cylinders, except where otherwise indicated in Hardware Schedule.
- 3. Lockset and Latchset Design: Solid lever with escutcheon, as selected by Architect.
- 4. Backset: 2-3/4".
- 5. Strikes: Furnish standard strikes with extended lips where required to protect trim from being marred by latch bolt; verify type of cutouts provided in metal frames.
- D. Cylinders, Keys, and Keying: Hardware manufacturers shall provide for grand master, master key alike or key different keying as directed by the owner.
  - 1. Provide cylinders of extruded brass bar material.
  - 2. Provide construction cylinders for doors requiring locking during construction; construction cylinders shall be removed and replaced just prior to owner occupancy.
  - 3. Submit keys for final use to owner; provide not less than two keys for each lockset, five of each type and level of master key, five grand master keys, all stamped "DO NOT DUPLICATE"; and 5% extra blanks.
  - 4. Hardware manufacturers shall key and register lock cylinders.
  - 5. Key Control System: Provide complete key control system with identification and storage capacity suitable for Project.
- E. Other Hardware: Provide as indicated, as specified, as included in Hardware Schedule, and as required for complete installation.

1. Acceptable Manufacturers:

PRODUCT	SPECIFIED MANUFACTURER	APPROVED SUBSTITUTIONS
HINGES	STANLEY	HAGER, IVES
CONTINUOUS HINGES	IVES	HAGER, STANLEY
CYLINDRICAL LOCKS	SCHLAGE "ND"	NONE
MORTISE LOCKS	SCHLAGE "L"	NONE
CYLINDERS	SCHLAGE	NONE
PANICS	VON DUPRIN	NONE
OFFSET PULLS	IVES	HAGER, TRIMCO
POWER TRANSFERS	VON DUPRIN	NONE
POWER SUPPLIES	VON DUPRIN	NONE
DOOR CORDS	LOCKNETICS	NONE
WIRE HARNESSSES	ALLEGION CONNECT	ABH
CLOSERS	LCN 4040XP	NONE
OVERHEAD STOP & HOLDS	GLYNN JOHNSON	RIXSON
FLUSHBOLTS	IVES	HAGER, TRIMCO
DUSTPROOF STRIKES	IVES	HAGER, TRIMCO
FLOORSTOPS	TRIMCO	IVES, HAGER
WALLSTOPS	IVES	HAGER, TRIMCO
KICKPLATES	IVES	HAGER, TRIMCO
SILENCERS	IVES	HAGER, TRIMCO
THRESHOLDS	NGP	PEMKO, ZERO
DOOR SWEEPS	NGP	PEMKO, ZERO

SEALS  
FLAT BAR ASTRAGALS

NGP  
NGP

PEMKO, ZERO  
PEMKO, ZERO

2. Weatherstripping: Provide continuous weatherstripping at top and sides of exterior doors.
3. Sound Gasketing: Continuous at top and sides of doors, where indicated.

#### **1.14 FINISHES**

- A. Finishes are identified in the Hardware Schedule included in this Section, but generally brushed chrome unless otherwise noted.

#### **1.15 PART 3- EXECUTION**

#### **1.16 INSTALLATION**

- A. Install finish hardware specified under this Section, coordinate with manufacture and installation of doors and frames.
- B. Fit hardware prior to painting, then remove for painting of doors and frames before final installation of hardware.
- C. Install hardware in accordance with manufacturer's instructions and DHI installation guide for doors and hardware.
- D. Fasteners: Use only manufacturers supplied fasteners. Drill and tap at metal and pilot holes at wood. No Tek type screws are acceptable.
- E. Installers qualifications
  1. Approved by supplier.
- F. Install finish hardware before painting for accurate fit and then remove for painting and reinstall after final painting.
- G. Adjust closers to conform with ADA and California Title 24.
- H. Hardware supplier shall visit jobsite prior to ordering hardware to verify compatibility of new hardware specified on existing doors and frames.
- I. No extra cost will be allowed because of changes or corrections necessary to facilitate installation of hardware.

#### **1.17 MOUNTING POSITIONS**

- A. Heights given are center line heights from finished floor.
  1. Locks and Latches: 38" to center of lever.
  2. Door Pulls: 42" to center of grip.
  3. Push Plate: 42"; coordinate with pull location.
  4. Push-Pull Bar: 42" to center of bar.



5. Top Hinge: To jamb manufacturer's standard, but not greater than 10" from head of frame to center line of hinge.
  6. Bottom Hinge: To jamb manufacturer's standard, but not greater than 12-1/2" from floor to center line of hinge.
  7. Intermediate Hinges: Equally spaced between top and bottom hinges and from each other.
  8. Hinge Mortise on Door Leaf: 1/4" to 5/16" from stop side of door.
  9. Dead Bolt: Not more than 44" from floor to operating lever.
- B. Comply with recommendations of Builders Hardware Manufacturers Association, subject to approval, for heights of items not indicated.

#### **1.18 ADJUSTMENT**

- A. After air supply is turned on, qualified hardware supplier's or manufacturer's representatives shall inspect installation and adjust.
1. Adjust closers, locks, and critical operational hardware.
  2. Deliver instructions for maintenance and future adjustments to the owner's representative.

#### **1.19 CERTIFICATION**

- A. At the completion of the Project and prior to final closeout, the hardware consultant shall visit the project and inspect all hardware installed. Consultant shall advise the owner by letter that all hardware is per specification, properly installed and correctly adjusted, or note matters that require correction. Failure to perform these obligations after notification shall result in the hiring of an outside consultant, at Contractor's expense.

#### **1.20 HARDWARE SCHEDULE**

- A. The Hardware Schedule establishes a type and standard of quality.
- B. Examine Drawings and Specifications and furnish proper hardware for door openings, whether listed or not.
- C. Bring omissions to attention of the Architect prior to bid opening for instructions; otherwise, list will be considered complete; no extras will be allowed.
- D. It is the responsibility of the contractor to install a complete operating door system that is compatible with the county's existing access control system. Contractor shall coordinate all access control work the access control contractor.
- E. Hardware Schedule by Groups:

**GROUP 1**

DOOR 100A, 206B

3 EA.	HINGES FBB179 4.5 X 4.5	652
1 EA.	CLASSROOM LOCK ND70R RHO	626
1 EA.	CLOSER 4040XP REGARM TBSRT	ALUM
1 EA.	FLOORSTOP 1211	626
1 EA.	KICKPLATE 8400 10 X 2 LDW B-CS	630
1 SET	SEALS 5040-C	CHARCOAL

VERIFY EXISTING FRAME STRIKE PREP @ 206B

**GROUP 2**

DOOR 100B, 206A

3 EA.	HINGES FBB179 4.5 X 4.5	652
1 EA.	CLASSROOM LOCK ND70R RHO	626
1 EA.	CLOSER 4040XP EDA TBSRT	ALUM
1 EA.	WALLSTOP WS406/407CCV	630
1 EA.	KICKPLATE 8400 10 X 2 LDW B-CS	630
1 SET	SEALS 5040-C	CHARCOAL

**GROUP 3**

DOOR 101A, 102A, 103A, 104A, 105A, 106A, 107A, 108A, 112A, 113A, 114A, 115A, 116A, 117A, 119A, 120A, 131A, 201A, 202A, 203A, 204A, 205A, 210A, 211A, 212A, 213A, 214A, 215A, 217A, 218A, 220A, 232A, 233A

3 EA.	HINGES FBB179 4.5 X 4.5	652
1 EA.	ENTRY LOCK ND53R RHO	626
1 EA.	WALLSTOP WS406/407CCV	630
1 SET	SEALS 5040-C	CHARCOAL

**GROUP 4**

DOOR 109A, 110A

ALL EXISTING HARDWARE TO BE REUSED

**GROUP 5**

DOOR 121A, 133A, 219A

1 EA.	CONTINUOUS HINGE 112HD X EPT	628
1 EA.	CARD READER BY ACCESS CONTROL PROVIDER	
1 EA.	DPS BY ACCESS CONTROL PROVIDER	
1 EA.	POWER SUPPLY BY ACCESS CONTROL PROVIDER	
1 EA.	PANIC AX-QELX-RX-LC-PA-33L x 360L-06 CON	626
1 EA.	MORTISE CYLINDER 20-061	626
1 EA.	POWER TRANSFER EPT-10 CON	628
2 EA.	WIRE HARNESS BY ACCESS CONTROL PROVIDER	
1 EA.	POWER SUPPLY PS914-4RL	600
1 EA.	CLOSER 4040XP EDA TBSRT x 4040XP-61	ALUM
1 EA.	DROP PLATE 4040XP-18PA	ALUM
1 EA.	FLOORSTOP 1214H	626
1 EA.	THRESHOLD 659 x 1/4-20 FHMS ANCHOR	ALUM
1 EA.	DOOR SWEEP C607A x #8 X 3/4" TEK SCREWS	ALUM
1 SET	WEATHERSTRIP BY STOREFRONT SUPPLIER	

**NOTE OF OPERATION:** PRESENTING AUTHORIZED CREDENTIAL TO CARD READER ELECTRICALLY RETRACTS PANIC LATCHBOLT AND ALLOWS ENTRY. DEPRESSING PUSH BAR ON INSIDE ALLOWS FOR IMMEDIATE EGRESS AT ALL TIMES. LOSS OF POWER LEAVES PANIC LOCKED AND USE OF KEY REQUIRED TO UNLOCK/LOCK OUTSIDE TRIM. ALL WIRING AND CONNECTIONS BY OTHERS.

**GROUP 6**

DOOR 122A, 134A, 207A, 221A, 222A,

3 EA.	HINGES FBB179 4.5 X 4.5	652
1 EA.	STOREROOM LOCK ND80R RHO	626
1 EA.	FLOORSTOP 1211	626
1 EA.	KICKPLATE 8400 10 X 2 LDW B-CS	630
3 EA.	SILENCERS SR64	GREY

VERIFY EXISTING FRAME STRIKE PREP @ 134A, 207A

**GROUP 7**

DOOR 123A, 124A, 125A, 224A, 225A, 231A

3 EA.	HINGES FBB179 4.5 X 4.5	652
1 EA.	INDICATOR LOCK L9456R 06A L583-363 L283-722	626
1 EA.	WALLSTOP WS406/407CCV	630
1 EA.	KICKPLATE 8400 10 X 2 LDW B-CS	630
1 SET	SEALS 5040-C	CHARCOAL

**NOTE OF OPERATION:** CLOSING DOOR TO TOILET AND TURNING ADA THUMBTURN THROWS DEADBOLT AND SHOWS "OCCUPIED" ON INDICATOR OUTSIDE. DEPRESSING INSIDE LEVER ON INSIDE RETRACTS DEADBOLT AND LATCHBOLT SIMULTANEOUSLY AND TURNS INDICATOR TO "UNOCCUPIED." ACCESS TO TOILET WHILE DOOR IS LOCKED BY KEY IN OUTSIDE CYLINDER.

**GROUP 8**

DOOR 130A, 228A

3 EA.	HINGES FBB179 4.5 X 4.5	652
1 EA.	ENTRY LOCK ND53R RHO	626
1 EA.	CLOSER 4040XP H TBSRT @ 90DEG.	ALUM
1 EA.	WALLSTOP WS406/407CCV	626
1 EA.	KICKPLATE 8400 10 X 2 LDW B-CS	630
1 SET	SEALS 5040-C	CHARCOAL

**GROUP 9**

DOOR 132A

2 EA.	HINGES FBB179 4.5 X 4.5 NRP	652
1 EA.	ELECTRIC CE58-FBB179 4.5 X 4.5	626
1 EA.	ELEC. LOCK ND80 EU R RHO 12/24V CON RX	626
1 EA.	WIRE HARNESS BY ACCESS CONTROL PROVIDER (DOOR)	
1 EA.	WIRE HARNESS BY ACCESS CONTROL PROVIDER (FRAME)	
1 EA.	CARD READER BY ACCESS CONTROL PROVIDER	
1 EA.	DPS BY ACCESS CONTROL PROVIDER	
1 EA.	POWER SUPPLY BY ACCESS CONTROL PROVIDER	
1 EA.	CLOSER 4040XP REGARM TBSRT	ALUM
1 EA.	FLOORSTOP 1211	626
1 SET	SEALS 5040-C	CHARCOAL

**NOTE OF OPERATION:** PRESENTING AUTHORIZED CREDENTIAL TO CARD READER ELECTRICALLY UNLOCKS OUTSIDE LEVER AND ALLOWS ENTRY. DEPRESSING INSIDE LEVER ALLOWS FOR IMMEDIATE EGRESS AT ALL TIMES. LOSS OF POWER LEAVES LOCK FAIL SECURE AND WILL REQUIRE USE OF KEY GAIN ENTRY. ALL WIRING AND CONNECTIONS BY OTHERS.

**GROUP 10**

DOOR 118A, 209A

3 EA.	HINGES FBB191 4.5 X 4.5 NRP	630
1 EA.	CARD READER BY ACCESS CONTROL PROVIDER	
1 EA.	DPS BY ACCESS CONTROL PROVIDER	
1 EA.	POWER SUPPLY BY ACCESS CONTROL PROVIDER	
1 EA.	PANIC AX-QELX-RX-LC-PA-98L X 996L-06 CON	626
1 EA.	RIM CYLINDER 20-057	626
1 EA.	DOOR CORD 788C-18	
1 EA.	WIRE HARNESS BY ACCESS CONTROL PROVIDER (DOOR)	
1 EA.	WIRE HARNESS BY ACCESS CONTROL PROVIDER (FRAME)	
1 EA.	POWER SUPPLY PS914-4RL	600
1 EA.	CLOSER 4040XP EDA TBSRT	ALUM
1 EA.	DROP PLATE 4040XP-18PA	ALUM
1 EA.	FLOORSTOP 1214H	626
1 EA.	THRESHOLD 659 x 1/4-20 FHMS ANCHOR	ALUM
1 EA.	DOOR SWEEP C607A x #8 X 3/4" TEK SCREWS	ALUM
1 SET	SEALS 5050-C	CHARCOAL

VERIFY EXISTING DOOR & FRAME 209A WILL ACCEPT NEW HARDWARE BEFORE ORDERING. SUPPLYING PRODUCT WITHOUT FIELD VERIFICATION WILL NOT ALLEVIATE RESPONSIBILITY OF SUPPLIER IN PROVIDING A FULLY OPERATIONAL OPENING.

**GROUP 11  
DOOR 200A**

1 EA.	CONTINUOUS HINGE 112HD X EPT	628
1 EA.	CONTINUOUS HINGE 112HD	628
1 EA.	CARD READER BY ACCESS CONTROL PROVIDER	
1 EA.	DPS BY ACCESS CONTROL PROVIDER	
1 EA.	POWER SUPPLY BY ACCESS CONTROL PROVIDER	
1 EA.	PANIC AX-QELX-RX-LC-PA-3347NL-OP CON @ LHR	626
1 EA.	RIM CYLINDER 20-057	626
1 EA.	PANIC AX-PA-3347EO @ RHR INACT	626
1 EA.	POWER TRANSFER EPT-10 CON	628
1 EA.	WIRE HARNESS BY ACCESS CONTROL PROVIDER (DOOR)	
1 EA.	WIRE HARNESS BY ACCESS CONTROL PROVIDER (DOOR/FRAME)	
1 EA.	POWER SUPPLY PS914-4RL	600
2 EA.	ADA OFFSET PULL 8190EZHD X-MTG	630
2 EA.	CLOSER 4040XP EDA TBSRT x 4040XP-61	ALUM
2 EA.	DROP PLATE 4040XP-18PA	ALUM
2 EA.	FLOORSTOP 1214H	626
1 EA.	THRESHOLD 659 x 1/4-20 FHMS ANCHOR	ALUM
2 EA.	DOOR SWEEP C607A x #8 X 3/4" TEK SCREWS	ALUM
1 SET	WEATHERSTRIP BY STOREFRONT SUPPLIER	

**NOTE OF OPERATION:** PRESENTING AUTHORIZED CREDENTIAL TO CARD READER ELECTRICALLY RETRACTS PANIC LATCHBOLT AT ACTIVE LEAF ONLY AND ALLOWS ENTRY. DEPRESSING PUSH BAR ON INSIDE OF EITHER LEAF ALLOWS FOR IMMEDIATE EGRESS AT ALL TIMES. LOSS OF POWER LEAVES PANIC LOCKED AND USE OF KEY REQUIRED FOR ENTRY. PANICS CAN BE DOGGED DOWN AND USED AS PUSH PULLS DURING BUSINESS HOURS AND THEN UNDOGGED FOR CARD READER ACCESS AFTER HOURS. ALL WIRING AND CONNECTIONS BY OTHERS.

**GROUP 12  
DOOR 200B**

2 EA.	HINGES FBB179 4.5 X 4.5 NRP	652
1 EA.	ELECTRIC CE58-FBB179 4.5 X 4.5	626
1 EA.	ELEC. LOCK ND80 EU R RHO 12/24V CON RX	626
2 EA.	WIRE HARNESS BY ACCESS CONTROL PROVIDER (DOOR/FRAME)	
1 EA.	CARD READER BY ACCESS CONTROL PROVIDER	
1 EA.	DPS BY ACCESS CONTROL PROVIDER	
1 EA.	POWER SUPPLY BY ACCESS CONTROL PROVIDER	
1 EA.	CLOSER 4040XP EDA TBSRT x 4040XP-61	ALUM
1 EA.	DROP PLATE 4040XP-18PA	ALUM
1 EA.	FLOORSTOP 1211	626
1 SET	WEATHERSTRIP BY STOREFRONT SUPPLIER	

**NOTE OF OPERATION:** PRESENTING AUTHORIZED CREDENTIAL TO CARD READER ELECTRICALLY UNLOCKS OUTSIDE LEVER AND ALLOWS ENTRY. DEPRESSING INSIDE LEVER ALLOWS FOR IMMEDIATE EGRESS AT ALL TIMES. LOSS OF POWER LEAVES LOCK FAIL SECURE AND WILL REQUIRE USE OF KEY GAIN ENTRY. ALL WIRING AND CONNECTIONS BY OTHERS.

**GROUP 13  
DOOR 208A**

6 EA.	HINGES FBB179 4.5 X 4.5 NRP	652
1 EA.	STOREROOM LOCK ND80R RHO	626
2 EA.	FLUSHBOLTS FB458-12"	626
1 EA.	DUSTPROOF STRIKE DP2	626
2 EA.	OVERHEAD STOPS 904H @ 90DEG.	630
2 EA.	KICKPLATES 8400 10 X 2 LDW B-CS	630
1 SET	SEALS 5040-C	CHARCOAL
1 EA.	ASTRAGAL 139SS	SS

VERIFY EXISTING FRAME CONDITION WILL ACCEPT NEW HARDWARE BEFORE ORDERING.  
SUPPLYING PRODUCT WITHOUT FIELD VERIFICATION WILL NOT ALLEVIATE RESPONSIBILITY  
OF SUPPLIER IN PROVIDING A FULLY OPERATIONAL OPENING.

**GROUP 14  
DOOR 230A**

NO HARDWARE REQUIRED – CASED OPENING

**END OF SECTION**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. Glass and glazing for windows and doors.

**1.2 SUBMITTALS**

- A. Product Data on Glass Types Specified: Provide structural, physical, and environmental characteristics, size limitations, and special handling or installation requirements.
- B. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, and special handling or installation requirements. Identify available colors.
- C. Submit documentation indicating that all tempered glazing to be installed on this project is certified by the Safety Glazing Certification Council.
- D. Samples:
  - 1. Glass: Submit two samples, 12 inches x 12 inches in size, illustrating each type of glazing.
  - 2. Glazing Sealant: Submit 3-inch-long bead of glazing sealant, color as selected by Architect.

**1.3 PERFORMANCE / DESIGN CRITERIA**

- A. Glass Strength: Analysis shall comply with ASTM E1300, Determining Load Resistance of Glass in Buildings. Provide glass products in the thickness and strengths (annealed or heat treated) required to meet or exceed the following criteria based on project loads and in-service conditions.
  - 1. Minimum thickness of annealed or heat-treated glass products to be selected so the worst-case probability of failure does not exceed the following:
    - a. Eight breaks per thousand for glass installed vertically or not fifteen degrees or more from the vertical plane and under wind action.
    - b. One break per thousand for glass installed fifteen degrees or more from the vertical plane and under action of wind and/or snow.
  - 2. Deflection must be limited to prevent disengagement from the frame and be less than or equal to 3/4 inch or L/175.
- B. Thermal and Optical Performance: Provide glass products with performance properties specified in this Section. Performance properties shall be manufacturer's published data as determined according to the following procedures:
  - 1. Center of glass U-Value: NFRC 100 methodology using LBNL WINDOW 5.2 computer program.
  - 2. Center of glass solar heat gain coefficient: NFRC 200 methodology using LBNL-35298 WINDOW 5.2 computer program.
  - 3. Solar optical properties: NFRC 300.

**1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with GANA Glazing Manual, IGMA North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use, and GANA Sealant Manual for glazing installation methods.

- B. Installer's Qualifications: The installation shall be performed only by an installation firm normally engaged in this business. All work shall be performed by qualified mechanics that specialize in glazing and glass installation.
- C. Safety glazing shall meet the requirements of 2019 CBC Section 2406 and shall be identified in accordance with 2019 CBC Sections 2403.1 and 2406.3, with identification etched in glass.
- D. Glass installation in frames shall comply with the Minimum Glazing Requirements in CBC Table 2403.2.1.

**1.5 JOB AND ENVIRONMENTAL CONDITIONS**

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 48 hours after installation of glazing compounds.

**1.6 FIELD MEASUREMENTS**

- A. Verify that field measurements are as indicated on shop Drawings.

**1.7 COORDINATION**

- A. Coordinate Work with glazing frames, wall openings, and adjacent Work.

**1.8 WARRANTY**

- A. Provide five-year limited warranty from date of manufacture for insulating units that are glazed in accordance with manufacturer's glazing instructions.

**PART 2 - PRODUCTS**

**2.1 GENERAL**

- A. All glass shall be graded and meet requirements of ASTM C1036 and ASTM C1048, Type 1, quality q3. Each light of glass delivered and installed shall have affixed thereto the manufacturer's grade label.
- B. All Low-E coated glass shall have a permanent marking affixed at the spacer identifying the coated surface.
- C. Glazing material installed in Hazardous Locations subject to human impact shall be certified and permanently labeled as meeting applicable requirements referenced in NFPA 80 and 2019 CBC Section 2406.
  - 1. CPSC 16 CFR 1201, Category I and II.

**2.2 GLASS TYPES**

- A. Type G-1: Low-E Insulating Glass:
  - 1. Acceptable Manufacturers:
    - a. Vitro Architectural Glass. Product: Solarban 70 (2) + Clear.
    - b. Oldcastle Glass.
    - c. Viracon.
    - d. Guardian.



- e. Substitutions: Refer to Section 01 60 00.
  - 2. Material: 1 inch thick hermetically sealed assembly consisting of 1/4 inch thick Low-E clear tempered glass on the outboard surface (coating on the #2 surface), 1/2 inch air space and 1/4 inch thick clear tempered glass on the inboard surface with a Winter Daytime U-value of 0.28 or less, Solar Heat Gain Coefficient (SHGC) of 0.27 or less, and Visible Light Transmittance of 64 percent.
- B. Type G-2: Float Glass:
- 1. Acceptable Manufacturers:
    - a. Vitro Architectural Glass.
    - b. Oldcastle Glass.
    - c. Viracon.
    - d. Guardian.
    - e. Or accepted equal.
  - 2. Material: 1/4 inch thick clear tempered glass.

### 2.3 GLAZING SEALANT

- A. Glazing Sealants: ASTM C920, Type S, Grade NS, Uses "G" and "A". Dow Corning 795, Tremco "Proglaze" or GE Silicone Sealants; Tremco "Mono" acrylic sealant or accepted equal. All sealants shall be compatible with the type of glazing and window frame to which they are applied.

### 2.4 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene EPDM blocks with a Shore A durometer hardness of 85, ±5 percent, chemically compatible with sealant used.
- B. Spacer Shims: Neoprene, 50-60 Shore A durometer hardness, minimum 3 inches long by one half the height of the glazing stop by thickness to suit application.
- C. Glazing Tape: 100 percent solids by weight, highly adhesive and elastic, cross-linked butyl rubber preformed tape with a continuous integral EPDM shim; 57 Shore 00 durometer hardness; black color; Tremco POLYshim II Tape or accepted equal.
- D. Glazing Splines: Resilient polyvinyl chloride extruded shape to suit glazing channel retaining slot; black color.
- E. Miscellaneous: Furnish all primers-sealers, setting blocks, shims, spacers, compression seals, etc., as required for a first class workmanlike job.

### 2.5 FABRICATION

- A. Flat Glass:
  - 1. Comply with ASTM C1036 Standard Specification for Flat Glass, Type 1, Class 1 (clear) or Class 2 (tinted, heat-absorbing and light reducing) and Quality q3.
  - 2. ASTM C1048 Heat Treated Flat Glass, Kind HS or FT, Condition A (uncoated), or C (other coated glass).
    - a. Heat Treated Flat Glass to be by horizontal (roller hearth) process with inherent rollerwave distortion parallel to the bottom edge of the glass as installed.

- b. Maximum peak to valley rollerwave 0.003 inch in the central area and 0.008 inch within 10.5 inches of the leading and trailing edge.
  - c. Maximum bow and warp 1/32 inch per lineal foot.
  - d. All tempered architectural safety glass shall conform to ANSI Z97.1 and CPSC 16 CFR 1201.
  - e. For all fully tempered glass, provide heat soak testing conforming to EN14179 which includes a two hour dwell at 290 degrees C, ±10 degrees C.
- B. Insulating Glass:
- 1. Comply with ASTM E2190 Standard Specification for Insulating Glass Unit Performance and Evaluation.
    - a. Units shall be certified for compliance by the IGCC in accordance with the above ASTM test method.
  - 2. The unit overall thickness tolerance shall be -1/16 inch / +1/32 inch.
  - 3. Comply with ASTM E546 Standard Test Method for Frost Point of Sealed Insulating Glass Units.
  - 4. Comply with ASTM E576 Standard Test Method for Frost Point of Sealed Insulating Glass Units in the Vertical Position.
  - 5. Sealed Insulating Glass Units to be double sealed with a primary seal of black polyisobutylene and a secondary seal of silicone.
    - a. The minimum thickness of the secondary seal shall be 1/16 inch.
    - b. The target width of the primary seal shall be 5/32 inch.
    - c. There shall be no voids or skips in the primary seal.
    - d. Up to a maximum of 3/32 inch of the airspace may be visible above the primary polyisobutylene sealant.
    - e. Gaps or skips between primary and secondary sealant are permitted to a maximum width of 1/16 inch by maximum length of 2 inches with gaps separated by at least 18 inches. Continuous contact between the primary seal and the secondary seal is desired.
  - 6. Provide a hermetically sealed and dehydrated space. Lites shall be separated by an aluminum spacer with three bent corners and one keyed-soldered corner or four bent corners and one straight butyl injected zinc plated steel straight key joint.
- C. Coated Vision Glass:
- 1. Comply with ASTM C1376 Standard for Pyrolytic and Vacuum Deposition Coatings on Glass.
  - 2. Coated products shall be magnetically sputtered vacuum deposition (MSVD).
  - 3. Edge Deletion: When Low-E coatings are used within an insulating unit, coating shall be edge deleted to completely seal the coating within the unit.
    - a. The edge deletion should be uniform in appearance (visually straight) and remove at least 95 percent of the coating.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify prepared openings for adequacy to receive glass.
- B. Verify that openings for glazing are correctly sized and within tolerance.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.
- D. Report in writing any conditions that may be detrimental to the Work.

#### 3.2 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Check that glass is free of edge damage or face imperfections.

#### 3.3 INSTALLATION

- A. General: Install glazing types at locations indicated on Drawings, according to glazing manufacturer's recommendations and as specified herein.
- B. Glass Glazing:
  - 1. Positioning Glass: Orient pattern and draw of glass pieces in same direction. Set all sheet glass so that any waves, etc. are horizontal.
  - 2. Do not cut, nip or abrade tempered glass.
  - 3. Watershed: Gunnable sealants, when applied as a cap head, shall form a bevel or watershed away from the glass. When tape is used to the sightline, it shall form a watershed when compressed. Do not undercut a sealant, compound, or tape below the sightline. Tool and finish sealant as required. Used tooling solution recommended by the sealant manufacturer.
  - 4. Positive Contact:
    - a. When applying a heel bead, lap onto the glass a minimum of 3/16 inch.
    - b. When applying a toe bead, whether continuous or a corner seal, make certain it is large enough to contact both the glass and sash. Install the sealant prior to glass placement.
  - 5. Setting blocks shall be 1/16 inch less than the full rabbet width, minimum length of 4 inches and high enough to provide the recommended minimum bite and edge clearance for the glass. Center blocks at 1/4 points unless otherwise recommended by the glass manufacturer.
  - 6. Provide spacer-shims at a maximum of 24 inches on center.
  - 7. Clearances: Observe minimum face clearances, edge clearance and glass bite as recommended by the glass and sealant manufacturers.
  - 8. Tape Installation: Do not install glazing tapes more than one day ahead of glass placement. Remove the paper backing from the tape only when the lite is ready

to be installed. Do not stretch the tape to make it fit. Do not overlap the ends of the tape. Instead, butt ends together, and when corners are butted together, daub with sealant to assure a positive seal.

9. Glazing tapes must be kept under proper compression.
10. Glazing stops shall be installed so that stop or frame does not bear directly against glass.
11. All glazing channels/rabbets shall be weeped so there is no standing water in contact with the insulating glass perimeter seal.

### **3.4 CLEANING**

- A. Clean work under provisions of Division 01.
- B. Remove glazing materials from finish surfaces.
- C. Remove temporary labels after work is complete.
- D. Clean glass.

### **3.5 PROTECTION OF FINISHED WORK**

- A. Protect finished Work under provisions of Division 01.
- B. Replacement: At completion of building construction and prior to its acceptance, all broken, cracked, excessively scratched, or otherwise imperfect glazing materials included under this Section shall be replaced with new glazing materials of the type specified, as directed by the Architect, and at no additional cost to the Owner.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SUMMARY**

A. Section Includes:

1. Provide three-coat Portland cement plaster (stucco) with metal lath and accessories as required for complete finished system.

**1.2 SUBMITTALS**

- A. Product Data: Submit manufacturer's product information and installation instructions for each lathing material and accessory, and for plaster materials.
- B. Shop Drawings: Indicate locations of control and expansion joints.
- C. Samples: Furnish 12" by 12" samples of system finishes.

**1.3 QUALITY ASSURANCE**

- A. Pre-Installation: Convene a pre-installation conference with the General Contractor, Architect and Inspector. Review materials, installation procedures, related trades, prevailing weather, and substrate conditions.

**1.4 PROJECT CONDITIONS**

- A. Take precautionary measures to ensure plaster is not subjected to excessive sun and wind which could cause uneven and excessive evaporation, premature dehydration, or cracking.
- B. Cold-Weather Requirements: Do not apply plaster unless minimum ambient temperature of 40 degrees F has been and continues to be maintained for minimum 48 hours prior to application and until plaster is cured.

**PART 2 PRODUCTS**

**2.1 MATERIALS**

- A. Portland Cement Plaster: Provide either neat or ready-mixed (where applicable) materials, at Contractor's option, complying with ASTM C926.
  1. Basecoat (Scratch coat) Materials:
    - a. Cement: Normal Type 1 or 1A Portland cement, ASTM C150.
    - b. Hydrated Lime: Special finishing hydrated lime, Type S, ASTM C206.
    - c. Aggregate: Natural sand, conforming to ASTM C897 or C144.
  2. Brown Coat Water Acrylic Admix: Acrylic polymer specifically manufactured for use in Portland Cement Plaster (Stucco) applications, and which will not detrimentally affect finish.
    - a. Manufacturers:

- 1) Larsen Products Corp./Acrylic Admix 101.
- 2) Thoro System Products, Inc./Acryl 60.
- 3) Chem-Masters Corp./Cretelox.
- 4) Substitutions: Refer to Section 01 60 00.
3. Finishing (Finish coat) Materials: Match Omega Products (800.600.6634)/AkroFlex as approved by Architect.
  - a. Paintable Finish: Pure, non-fading, mineral oxide color conforming to ASTM C979 and designed and mixed to provide uniform color finish coat.
  - b. Color: Color of plaster to match existing; custom color may be required.
4. Water: Clean, fresh and free from injurious amounts of oil, acid, alkali, organic matter or other deleterious substances.
5. Bond Coating: Per ASTM C932 equal to "Weld-Crete" by Larsens Products.
- B. Metal Components: Comply with requirements of ASTM C1063.
  1. Exterior Components: Hot-dip galvanized finish; ASTM A924 and A653 minimum G90 for 18 gage and lighter formed metal products, ASTM A123 galvanized after fabrication for 16 gage and heavier products.
    - a. Exposed Exterior Components: Zinc accessories unless fully concealed in plaster.
    - b. Anchorage and Fastening: Approved devices of type and size to suit application and to rigidly secure suspension system.
  2. Lathing:
    - a. Exterior Metal Wall Lath: 18-gauge x 1 inch or 17 gauge x 1.5" woven wire fabric at vertical applications, 1.4 lbs. per square yard. Davis Wire or equal.
    - b. Anchorage: Furring nails meeting the requirements of Table 2507.2, 2022 California Building Code with cardboard spacers.
- C. Accessories: Provide as indicated, as recommended by referenced standards, and as required for complete installation.
  1. Manufacturers:
    - a. Stockton Products.
    - b. Substitutions: Refer to Section 01 60 00.
  2. Plaster trim noted in this section refers to Stockton Products Company materials.
  3. Foundation Weep Screed: Blind Stop, No. BSS, 26-gauge G90 galvanized steel, weep holes
  4. "J" Mold: Casing Bead, No. CDB, G90 galvanized steel.

5. Control Joint: Double "V" expanded flange control joint No. DVZCJ #15, zinc.
  6. Horizontal Expansion Joint: Water resistant channel, 2-piece, No. EWS, 26-gauge G90 galvanized steel. See drawings for width of reveal.
  7. Vertical Expansion Joint: Expansion channel screed, 2-piece, No. ECS #4, 26-gauge G90 galvanized steel. See drawings for width of reveal.
  8. Door or Window Head Trim: "F" Drip Mold No. F-D 75-75 with 1/8" weep holes, extruded, anodized aluminum.
  9. Door or Window Casing: Door or Window Molding No. FRWM, extruded anodized aluminum.
- D. Anchorages: Tie wire, nails, screws and other approved metal supports, of type and size to suit application.
1. Lath to Metal Studs: Zinc plated, Phillips head, wafer head galvanized self-drilling screws #8 x 1-1/4".
  2. Lath to Wood Studs: 1/2" wide, 9-gauge ring shanks hook staple around 10d galvanized nails.
- E. Backing and Sealants:
1. General Lath Backing: "Super Jumbo Tex" by Fortifiber Building Systems.
  2. Self-Sealing Underlayment: W.R. Grace "Vicor V40".
  3. Butyl Tape: 2" wide x 1/8" industrial butyl adhesive/sealant tape equal to DENSO North America, Inc.
  4. Sealant: Equal to Tremco "Vulkem 116" polyurethane.

## **2.2 PLASTER MIXES**

- A. Provide plaster mixes in accordance with ASTM C926 as appropriate to the substrate indicated and the approved samples.
- B. Mix only as much plaster as can be used in one hour.
- C. Mix materials dry, to uniform color and consistency, before adding water.
- D. Protect mixes from frost, dust and evaporation.
- E. Do not retemper mixes after initial set has occurred.

## **PART 3 EXECUTION**

### **3.1 PREPARATION**

- A. Examine areas and substrates, with installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.

- B. Coordinate suspended work with structural work to ensure inserts and structural anchorage provisions have been installed to receive hangers.
  - 1. Coordinate location of hangers with other work.
- C. Prior to application ensure mechanical and electrical services behind surfaces to receive cement plaster have been tested and approved.
- D. Ensure metal framing has been properly installed and rigidly secured.

### **3.2 INSTALLATION**

- A. Erect furring and lath in accordance with Chapter 25, Section 2507, 2016 California Building Code.
- B. Install work true to lines and levels and to provide surface flatness with maximum variation of 1/8" in 10'-0" in any direction.
- C. Isolation: Isolate lathing and metal support system where it abuts building structure horizontally, and where partition/wall work abuts overhead structure, to prevent transfer of building loads into plaster.
  - 1. Install slip or cushion type joints to absorb deflections but maintain lateral support.
- D. Frame both sides of expansion joints independently unless otherwise indicated, do not bridge joints with furring and lathing or accessories.
- E. Coordinate installation of anchors, blocking, electrical and mechanical work which is to be placed in or behind framing; allow such items to be installed after framing is complete.
- F. Install expansion and control joints so plaster areas do not exceed 120 ft<sup>2</sup>, and with area sides having a maximum one to two and a half (1:2-1/2) ratio, unless otherwise approved by Architect.
- G. Metal Lathing: Apply lath taut, with long dimension perpendicular to supports; secure end laps with tie wire where they occur between supports; lap sides minimum 1-1/2"; secure with tie wires.
  - 1. Apply 2" wide butyl tape under all lath fasteners and over underlayment.
  - 2. Continuously reinforce internal angles.
  - 3. Place 6" wide x 12" long strips of metal lath diagonally at corners of openings; secure rigidly in place.
  - 4. Place 6" wide strips of metal lath at junctions of dissimilar materials; place parallel with dissimilar materials; secure rigidly in place.
- H. Installation of Metal Accessories:
  - 1. Fasten in place true to line and in correct relation to adjacent materials and as required to prevent dislodging and misalignment by subsequent operations.
  - 2. Fasten at both ends and at maximum 12" on center along sides.



3. Bring grounding edge of accessories to true lines, plumb, level, and straight.
  4. Install accessories to provide required depth of plaster and to bring plaster surface to required plane.
  5. Install continuous corner reinforcement for full length of external corners.
  6. Install sill and drip screeds with paper sheathing and lath installed over attachment flange of screeds.
  7. Beads: Use single length of metal beads wherever length of run does not exceed longest standard stock length available; miter or cope corners.
    - a. Provide casing beads where plaster abuts dissimilar construction and at perimeter of openings where edges of plaster will not be concealed by other work.
- I. Portland Cement Plaster: Conform to ASTM C926.
1. Cement Plaster: Apply three coat cement plaster system, scratch, brown, and finish coats.
    - a. Apply scratch coat to minimum thickness of 3/8"; allow to moist cure for minimum period of 48 hours.
    - b. Apply brown coat to minimum thickness of 3/8".
    - c. Allow brown coat to cure for minimum 5 days prior to application of finish coat.
    - d. Evenly dampen base coat, to ensure uniform suction, and apply finish coat; apply thickness sufficient to secure required texture but in no case less than 1/8".
    - e. Apply pre-mixed finish coat in accordance with manufacturer's recommendations.
  2. Maintain surface flatness, with maximum variation of 1/8" in 10'-0".
  3. Avoid excessive working of surface, delay troweling as long as possible to avoid drawing excess fines to surface.
- J. Finish: Comply with finish manufacturer recommendations and application instructions; finish to match approved sample panel.

### **3.3 CUTTING AND PATCHING**

- A. Cut, patch, point, and repair plaster as necessary to accommodate other work and to restore cracks, dents, and imperfections.
- B. Repair or replace work to eliminate blisters, buckles, crazing, check cracking, dry-outs, efflorescence, sweat-outs, and similar defects.
- C. Finish cutting and patching to match undamaged plaster; patching shall not be visible in finished installation.

### **3.4 CLEANING**

- A. Promptly remove plaster from surfaces not indicated to be plastered.
- B. Repair surfaces stained, marred or otherwise damaged during plastering.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Gypsum board wall and ceiling systems.
  - 2. Trim accessories, Joint compound, control joints, fasteners, reveal moldings, and sealants.
  - 3. Schedule - Level of Finish for gypsum board surfaces.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate with Wall Type Schedule for gypsum board systems used in conjunction with work of this Section.
- B. Preinstallation Conference: Arrange two weeks prior to beginning work of this Section.
  - 1. Walk job and determine full extent level of quality for work.
  - 2. Coordinate gypsum board pre installation conference with veneer plaster pre installation conference as specified in Section 09 26 00.

**1.3 SUBMITTALS**

- A. Shop Drawings
  - 1. Plan that indicates locations of control joints
- B. Product Data
  - 1. Manufacturer's published descriptive literature for gypsum board types, trim accessories, and control joints pertinent to this Section.
  - 2. Furnish manufacturer's certification indicating products comply with Contract Documents and applicable codes.
- C. Field Mock-Up to illustrate final quality.
- D. Test Data:
  - 1. Per ASTM E 119 Certified testing lab Design for each proprietary fire-resistive wall and ceiling assembly listing manufacturers and products. Unlisted manufacturers and products not accepted.

**1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications:

1. Company with minimum 5 years documented experience.
  2. Able to supply complete and tested systems conforming to code.
- B. Installer Qualifications:
1. Company specializing in work of this section with documented experience in commercial quality work of comparable scope.
- C. Mock-Up:
1. Install 8 square foot minimum mock-ups of gypsum board finish and control joints.
  2. Approved mock-ups may be incorporated into Work and become standard for approved workmanship and finishes.
- D. Regulatory Requirements:
1. California Building Code, CCR Title 24, Part 2:
    - a. CBC– Chapter 7, Fire Resistant Materials and Construction.
    - b. CBC – Chapter 19A, Concrete.
    - c. CBC – Chapter 25, Gypsum Board and Plaster.
  2. Fire Resistance Rated Assemblies: For fire resistance rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
  3. Fire Resistance Rated Assemblies: For fire resistance rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
- E. Single Source Responsibility:
1. Panel Products: Obtain each type of gypsum board and other panel products from single manufacturer.
  2. Finishing Materials: To the extent possible, obtain finishing materials from same manufacturer supplying gypsum board products. When not possible, obtain materials from manufacturer acceptable to gypsum board manufacturer.
  3. Recycled Content: Indicate recycled content; indicate percentage of pre-consumer and postconsumer recycled content per unit of product.
  4. Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials in original unbroken containers or bundles bearing name of manufacturer and brand.
- B. Verify products undamaged before acceptance at Project Site. Do not use products with

visible signs of mold growth and damage.

- C. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

## **1.6 FIELD CONDITIONS**

- A. Temperature, Ventilation and Moisture: Conform to GA-216 and manufacturer's instructions. Maintain temporary controls to regulate heating, ventilating, moisture, and humidity levels. Do not begin taping and finishing until following conditions are achieved.
  - 1. Building: Fully enclosed and free of standing water. Watertight roofing and wall envelope systems in place and space is not exposed to other sources of water.
  - 2. Temperature: Between 50- and 95-degrees F for minimum 48 hours.
  - 3. Gypsum Board Moisture Content: 0.4 percent on gypsum scale (12 percent on wood scale).
  - 4. Wood Substrate Moisture Content: Maximum 16 percent.
- B. Immediately remove from site gypsum board for interior use exposed to water, including gypsum board with water stains, with signs of mold, and gypsum board with mildew.
- C. Lighting: Sufficient temporary lighting to perform work to achieve specified finishes.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Georgia Pacific Corp. (GP)
- B. United States Gypsum Corp. (USG)
- C. CertainTeed Gypsum, Inc.
- D. National Gypsum
- E. Pabco Gypsum
- F. Or accepted equal.

### **2.2 PERFORMANCE / DESIGN CRITERIA**

- A. Gypsum Board Products: Conform to general provisions of ASTM C1396.
  - 1. Ends square cut and edges tapered.
  - 2. Gypsum Board at Non-Rated Assemblies: 5/8 inch thick, type 1X
  - 3. Gypsum Board at Fire-Resistive Rated Assemblies: 5/8 inch thick, UL labeled, and conforming to ICC ES Report for Type X or Type C.

4. Mold-Resistant Interior Panels: Conform to general provisions of ASTM C1658 or ASTM C1396. Test to ASTM D3273 with Rating of 10 or Test to ASTM G21 with Score of 0.

**B. Abuse-Resistant and Impact Resistant Interior Panels:**

1. Surface Abrasion Resistance: Test to ASTM C1629 and ASTM D4977 for maximum surface damage:
  - a. Level 1: 0.126 inch (3.2mm).
  - b. Level 2: 0.059 inch (1.5mm).
  - c. Level 3: 0.010 inch (0.3mm).
2. Surface Indentation: Test to ASTM C1629 and ASTM D5420 for indentation resistance.
  - a. Level 1: 0.150 inch (3.8mm).
  - b. Level 2: 0.100 inch (2.5mm).
  - c. Level 3: 0.50 inch (1.3mm).
3. Soft Body Impact: Test to ASTM C1629 and ASTM E695 until failure.
  - a. Level 1: 90 ft.-lbs. (122 J).
  - b. Level 2: 195 ft.-lbs. (265 J).
  - c. Level 3: 300 ft.-lbs. (408 J).
4. Hard Body Impact: Test to ASTM C1629 until failure.
  - a. Level 1: 50 ft.-lbs. (68 J).
  - b. Level 2: 100 ft.-lbs. (136 J).
  - c. Level 3: 150 ft.-lbs. (204 J).

**2.3 MATERIALS**

**A. Paper Faced Gypsum Board: Conform to ASTM C1396.**

1. GP ToughRock.
2. USG Sheetrock.
3. CertainTeed Gypsum, Inc., ProRoc Gypsum Board.
4. Pabco Gypsum Flame Curb.

**B. Moisture and Mold-Resistant Gypsum Board:**

1. GP Dens-Armor Plus, glass mat facings on front and back and moisture-resistant

- core.
  - 2. GP ToughRock Mold-Guard<moisture-resistant paper face.
  - 3. USG Fiberock Aqua Tough, unfaced, solid moisture-resistant core.
  - 4. USG Sheetrock Mold Tough<moisture-resistant core and paper face.
  - 5. CertainTeed Gypsum, Inc.: ProRoc Moisture and Mold Resistant with M2Tech.
  - 6. Pabco Gypsum Mold Curb.
- C. Moisture and Mold-Resistant Gypsum Board for tile baker:
- 1. GP DensShield, fiberglass mat facings on front and back and moisture-resistant core. 5/8" thick and fire-rated where shown in the drawings
- D. Moisture, Mold, and Abuse-Resistant Gypsum Board: Tested for mold resistance in conformance to ASTM D3273 (Rating of 10) or ASTM G21 (Score of 0), and conforming to ASTM C1629 Classifications for abuse-resistance (Levels I, II, or III).
- 1. GP Dens-Armor Plus AbuseGuard.
    - a. Surface Abrasion: Level 3.
    - b. Indentation Resistance: Level 1.
    - c. Soft-Body Impact: Level 1.
  - 2. USG Sheetrock Mold Tough AR
    - a. Surface Abrasion: Level 2
    - b. Indentation Resistance: Level 2
    - c. Soft-Body Impact: Level 1
  - 3. USG Fiberock Aqua Tough Interior Panel.
    - a. Surface Abrasion: Level 2.
    - b. Surface Indentation: Level 2.
    - c. Soft Body Impact Test: Level 2.
  - 4. CertainTeed Gypsum, Inc.: ProRoc Extra Abuse Type X Gypsum Board with M2Tech.
    - a. Surface Abrasion: Level 2.
    - b. Indentation Resistance: Level 1.
    - c. Soft Body Impact: Level 3.
    - d. Hard Body Impact: Level 1.

- E. Moisture, Mold, and Impact-Resistant/Mold-Resistant Enhanced Gypsum Board: ASTM C1629 and ASTM D3273 level 10.
  - 1. GP Dens-Armor Plus Impact-Resistant.
    - a. Surface Abrasion: Level 3 (0.126 inch abraded depth).
    - b. Surface Indentation: Level 1 (0.150 inch indentation).
    - c. Soft Body Impact: Level 3 (300 ft.-lbs.).
    - d. Hard Body Impact: Level 2 (100 ft.-lbs.).
  - 2. USG Fiberock Aqua Tough with Tuff Hide Primer Sealer.
    - a. Surface Abrasion: Level 3.
    - b. Surface Indentation: Level 2.
    - c. Soft Body Impact: Level 3.
    - d. Hard Body Impact: Level 2.
- F. High Impact Hard Body Impact Gypsum Board Panel: ASTM C1278. <consider as replacement for veneer plaster using surfacer, as instructed by manufacturer.
  - 1. USG Fiberock Very High Impact (VHI).
    - a. Surface Abrasion: Level 2.
    - b. Surface Indentation: Level 2.
    - c. Soft Body Impact: Level 3.
    - d. Hard Body Impact: Level 3.

## **2.4 ACCESSORIES**

- A. Comply with ASTM C840 and in accordance with GA-216.
  - 1. Gypsum board sealer / masking: One Coat "Hamilton Prep Coat Plus" prior to application of gypsum board texture (sealer provided by spec section 09 90 00 Painting and Coating, masking in accordance with this section 09 29 00 Gypsum Board).
  - 2. Provide protective coated steel corner beads and edge trim; type designed to be concealed in finished construction by tape and joint compound.
  - 3. Corner Beads: Manufacturer's standard metal beads.
  - 4. Edge Trim: "J", "L", "LK", or "LC" casing beads – manufacturer's standard.
  - 5. Reinforcing Tape, Joint Compound, Adhesive, Water, Fasteners: Types recommended by system manufacturer and conforming to ASTM C475.
    - a. Typical Joint Compound: Chemical hardening type for bedding and filling, ready-

mixed or powder vinyl type for topping.

6. Control Joints: Back-to-back casing beads.
  - a. Back control joints with 4 mil thick polyethylene air seal.
  
- B. Joint Treatment – ASTM C475 / C475M:
  1. Joint Tape:
    - a. Exterior Gypsum Soffit Board: USG Sheetrock Brand Paper Tape.
    - b. Glass Mat Gypsum Sheathing Board Exterior Applications: USG Sheetrock Brand Paper Tape.
    - c. Interior Gypsum Board: USG Sheetrock Brand Paper Tape.
  2. Joint Compound:
    - a. Gypsum Board – Prefilling - At open joints, rounded or beveled panel edges, and damaged surface areas, use setting type taping compound: USG Sheetrock Brand Easy Sand Setting-Type Joint Compound:
      - 1) Embedding and First Coat - For embedding tape and first coat on joints, fasteners, and trim flanges, use setting type taping compound. USG Sheetrock Brand All Purpose Joint Compound:
        - a) Use setting type compound for installing paper faced metal trim accessories: USG Sheetrock Brand All Purpose Joint Compound.
      - 2) Fill Coat: For second coat, use setting type, sandable topping compound: USG Sheetrock Brand Topping Joint Compound.
      - 3) Finish Coat: For third coat, use setting type, sandable topping compound: USG Sheetrock Brand Topping Joint Compound.
      - 4) Skim Coat: For final coat of Level 5 finish, use setting type, sandable topping compound: USG Sheetrock Brand Topping Joint Compound.
    - b. Tile Backing Panels: USG Sheetrock Brand Easy Sand Setting-Type Joint Compound.
    - c. Water Resistant Gypsum Backing Board: Use setting type taping compound and setting-type, sandable topping compound: USG Sheetrock Brand Easy Sand Setting-Type Joint Compound.
    - d. Glass Mat Sheathing Board: USG Sheetrock Brand Easy Sand Setting-Type Joint Compound.
  3. Fiberglass Tape: 2 inches wide 10 x 10 fiberglass mesh.
    - a. Reinforcing fabric: Balanced, alkali-resistant, open-weave, glass fiber fabric, made from continuous multi-end strands with tensile strength of not less than 120 lbs. and 140 lbs. in wrap and fill directions, respectively, per ASTM D1682 and complying with ASTM D578, and of 4.30 oz./sq. minimum weight.
  
- C. Acoustic Sealant: Serious Energy “Quiet Seal Pro”, non-hardening, gun grade sealant per



ASTM C834.

1. Or Architect Approved Substitute.
- D. Primer/Surfacer for Level 5 Finish: USG Tuff-Hide Primer-Surfacer.
- E. Acoustical Sealant at Exposed Joints: Nonsag, paintable, nonstaining, latex sealant conforming to ASTM C834. Tested to ASTM E90 for reduction of airborne sound transmission through perimeter joints and openings in building construction at representative assemblies. Specified for type and quality.
- F. Acoustical Sealant at Concealed Joints:
1. Synthetic Rubber Joint Sealant: Single component, non-skinning, non-hardening, 90 percent solids, acoustical properties conforming to ASTM C919 and to ASTM E90.
  2. Water Based Siliconized Acrylic Latex:
  3. Install 2 beads under steel stud framing channel and wood plates and into 1/2-inch space between top of floor and bottom of gypsum board and plaster systems.

## **2.5 TRIM**

- A. Provide trim shapes as required to cover and make neat edges.
- B. Paper Faced Metal Bead and Trim: ASTM C1047, electro-galvanized steel with paper face and flanges, USG Beadex specified for type and quality.
1. Outside corner beads.
  2. Inside corners.
  3. L-type edge trims.
  4. J-shaped edge trim.
  5. 3/4-inch radius corner beads.
- C. Metal Trim Shapes: ASTM C1047.
1. Galvanized steel Expanded Flange Corner Bead, L-Trim, and J-Trim.
  2. Galvanized one-piece L-Trim, and J-Stop.
  3. Zinc Control Joint No. 093.

## **2.6 REVEAL MOLDINGS**

- A. Reveal Moldings: Aluminum 6063 T5 alloy with chemical conversion coating.
- B. 1/2 Inch F Reveal Moldings: Fry Reglet, DRMF-625-50, 5/8 inch deep by 1/2 inch wide.
- C. 3/4 Inch F Reveal Moldings: Fry Reglet, DRMF-625-75, 5/8 inch deep by 3/4 inch wide.

## **2.7 FASTENERS**

- A. Screws conforming to ASTM C1002. Bugle or pan head, and lengths as required for securing materials in place.
  - 1. Light Gauge Metal Framing: Type S.
  - 2. 18 Gauge or Heavier Metal Framing: Type S-12.
- B. Pneumatic Fasteners:
  - 1. Minimum 0.100-inch diameter.
  - 2. Length to penetrate minimum 1/4 inch beyond steel stud framing.
  - 3. Aerocote 1000 corrosion-resistant coating.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify installation conditions as satisfactory to receive work of this Section before beginning.
- B. Building Envelope: conform to following:
  - 1. Do not begin work until building envelope is fully enclosed and temperature, ventilation, and humidity are controlled.
  - 2. Do not begin work under conditions that gypsum board installation may be exposed to contact with water.

#### **3.2 PREPARATION**

- A. Protect surrounding areas and surfaces to preclude damage.
- B. Avoid soiling, spatter, and damage to work of other trades. Use cover cloths, or other means of protection. Remove, clean, and repair soiled or damaged work.

#### **3.3 INSTALLATION**

- A. Conform to ASTM C840, GA-216, and manufacturer's instructions.
- B. Corner Trim: Reinforce external corners with specified corner beads.
- C. Edge Trim: Install square edged metal trim bead at exposed edges and boundaries of areas and where abutting dissimilar materials.
- D. Reveal Trim:
  - 1. Install with screws at 12 inches on center in 10-foot lengths, except where shorter lengths are sufficient for dimension of wall plane.
  - 2. Make butt joints tight and in alignment.
  - 3. Miter corners.

4. Promptly remove excess joint compound.
- E. Control Joints: Conform to WCB Tech Bulletin Control Joints and GA-234, except as otherwise indicated. Verify that required double framing is in place before installing control joints.
1. Door and Other Openings: Install control joints at each side of wall opening and at both sides of wall, except alcoves and similar wall configurations.
  2. Continuous Wall Planes: Install control joints floor to ceiling at each 30 lineal foot of wall.
  3. Ceilings: Install across ceiling at each 50 lineal foot distance and each 2500 square foot of ceiling area.
  4. Joints with Other Materials: Install where gypsum board meets masonry, concrete, and other materials, except where joints are concealed under horizontal chair rails or other trim.
- F. Other Trim: Install as indicated or required for complete and finished installation.
- G. Panel Joints:
1. Layout: Design to reduce joints to minimum.
  2. Install board in maximum lengths to minimize horizontal and vertical joints.
  3. Start installation of panels at exterior wall to position butt joints as far away from exterior wall as possible.
  4. Place edges in contact and fit neatly, without forcing into place.
  5. Stagger joints on opposite sides of partitions and on same side of wall surface at adjacent joints.
  6. Maintain 1/2-inch clearance from bottom of wall panel and top of floor. Seal with acoustical sealant.
  7. In order to prevent wicking of moisture, do not let gypsum board rest on floor after installation.
- H. Single Layer Systems: Install in accordance with ASTM C840. Where modified, amended, or required by fire resistive or sound isolation system, conform to the requirements of the manufacturer's tests, as approved.
- I. Double Layer Systems: Install in accordance with ASTM C840, including System VIII for double layer gypsum wallboard installations applied with screws. Conform to required fire resistance standards.
1. Use gypsum backing board for first layer, placed parallel to framing or furring members. Use fire rated gypsum backing board for fire rated partitions. Place second layer perpendicular to first layer (unless noted otherwise within rated assembly). Offset joints of second layer from joints of first layer.
- J. Moisture and Mold Resistant Gypsum Board: Install at restrooms, kitchen, janitorial closets,

and areas where moisture is present. Do not install as backer board for ceramic tile.

- K. Joint Sealant and Acoustical Sealant: Install to completely fill void between wallboard edges and adjacent surface.
- L. Plumbing, HVAC, and Electrical: Coordinate with Division 22, Division 23 and Division 26. Provide for installations and penetrations of ductwork, equipment, receptacles, and other work.

### **3.4 FINISHING OF GYPSUM BOARD**

- A. Conform to GA-214, ASTM C840, manufacturers' instructions, and provisions of Contract Documents.
- B. Level 1: Joints and interior angles shall have tape set in joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.
- C. Level 2: Joints and interior angles shall have tape embedded in joint compound and wiped with a joint knife leaving a thin coating of joint compound over all joints and interior angles. Fastener heads and accessories shall be covered with a coat of joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.
- D. Level 3: Joints and interior angles shall have tape embedded in joint compound and one additional coat of joint compound applied over all joints and interior angles. Fastener heads and accessories shall be covered with two separate coats of joint compound. All joint compounds shall be smooth and free of tool marks and ridges.
- E. Level 4: Joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. All joint compounds shall be smooth and free of tool marks and ridges.
- F. Level 5: Joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles. Fastener heads and accessories shall be covered with three separate coats of joint compound. A thin skim coat of joint compound shall be applied to the entire surface. The surface shall be smooth and free of tool marks and ridges.

### **3.5 TRIM AND JOINT FINISHING**

- A. Joints and Interior Angles: Embed tape in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads, and accessories. Tool joint compound smooth and free of tool marks and ridges.
  - 1. Center reinforcing tape over joint and coat into compound leaving approximately 1/64 inch to 1/32 inch under tape to provide proper bond.
  - 2. Follow with skim coat to embed tape, but not to function as second coat.
  - 3. Allow embedding coat to thoroughly dry prior to application of second coat.
  - 4. Allow second coat to thoroughly dry.
  - 5. Apply third coat evenly over and extending beyond second coat on joints, feathering

to smooth uniform finish.

- B. Beads, Trim, Fastener and Joint Depressions:
  - 1. Cover with three coats of taping and joint compound. Apply in different directions making smooth transitions with adjacent surfaces.
  - 2. Allow sufficient drying time between coats.
  - 3. Leave depressions flush with surface plane.
- C. Treat angles with reinforcing tape and metal trim folded to conform to adjacent surfaces for straight and true angles and edges.
- D. Allow a minimum of 24 hours' drying time between applications of compounds.
- E. Treat fastener head depressions and marred spots on surface of board with one coat of joint compound and number of coats of finishing compound as required to comply with the level of finish specified and to assure that they will be invisible after application of painted finish or wall covering.
- F. After each application of joint or finishing compound has dried, lightly sand joints.
- G. Finish surfaces shall be plumb, have straight surfaces with no waves or buckles, and shall be free of unevenness at joints. Surfaces shall be uniformly smooth and ready for painting, wall covering, or other finishes.
- H. At mechanical rooms and other areas indicated to be fire-taped, perform minimum taping and cementing of joints and fastener heads to meet applicable code requirements.
- I. Apply a skip-trowel texture finish for board at mechanical rooms and other areas indicated or scheduled. All other areas shall be finished smooth.

### **3.6 TOLERANCES**

- A. Shim panels as necessary to conform to tolerances.
- B. Between Board Faces: 1/16-inch offset.

### **3.7 REPAIR**

- A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including non-decorated surfaces.
- B. Patch holes or openings 1/2 inch (13 mm) or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.
- C. Repair holes or openings over 1/2-inch (13 mm) diameter, with 16 mm (5/8 inch) thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.
- D. Remove and replace following gypsum board installations:
  - 1. Board in contact with water for over 18-hour time period.

2. Gypsum core exhibiting dampness or water intrusion.
3. Facing paper exhibiting delamination.
4. Facing or core exhibiting mold growth or turning black.
5. Board sagging or warped.
6. Board directly exposed to water determined to be contaminated.

**3.8 PROTECTION OF FINISHED WORK**

- A. Maintain temperature and humidity conditions required by manufacturer to protect the installation.
- B. Protect completed Work from damage or deterioration until Final Acceptance of the Work.

**3.9 CLEANING**

- A. Clean beads, screeds, metal base, metal trim, mechanical and electrical items, and other work.
- B. Wipe clean, leaving work ready for finish specified under other Sections.
- C. As work is completed in each space, clean all rubbish, utensils, and surplus materials from the space. Leave floors broom-clean.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Suspended metal grid ceiling system.
- B. Lay-in acoustical panels.
- C. Specialty ceiling systems.
- D. Ceiling perimeter trim systems.

**1.2 SYSTEM DESCRIPTION**

- A. Performance Requirements: Rigidly secure suspended acoustical ceiling systems, including integral mechanical and electrical components with maximum deflection of 1/360.

**1.3 SUBMITTALS**

- A. Product Data: Provide data on metal grid system components and acoustical units.
- B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other work or ceiling finishes, interrelations of mechanical and electrical items related to system.
- C. Samples:
  - 1. Submit two samples 6 inch by 12 inch in size illustrating material and finish of acoustical units.
  - 2. Submit two samples each, 12 inch long, of suspension system main runner, cross runner and edge trim.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

**1.4 QUALITY ASSURANCE**

- A. Qualifications
  - 1. Metal Suspension Grid Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section with a minimum 10 years experience.
  - 2. Lay-in Acoustical Tile Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section with a minimum 10 years experience.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- B. Storage and Protection: Store materials in a dry secure place. Protect from weather, surface contaminants, construction traffic, and other potential damage.

**1.6 ENVIRONMENTAL REQUIREMENTS**

- A. Maintain 60 degrees F minimum uniform temperature and 20 percent to 40 percent relative humidity prior to, during, and after installation of acoustical lay-in tiles.

**1.7 SEQUENCING**

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust-generating activities have terminated and overhead work is completed, tested and approved.
- B. Install acoustical units after interior wet work is dry.

**1.8 MAINTENANCE**

- A. Extra Materials:
  - 1. Provide 10 percent extra of each type of panel.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Acceptable Manufacturers – Lay-in Acoustical Panels:
  - 1. Armstrong World Industries, Inc.
  - 2. USG Interiors, Inc.
  - 3. Or accepted equal.

**2.2 METAL SUSPENSION SYSTEM**

- A. Metal Suspension Grid: ASTM C635, heavy duty classification; hot-dipped galvanized steel (minimum G40); 15/16 inch (24 mm) face; structural tee main and cross members; capped with steel, coated with factory applied baked-on enamel paint.

- B. Products:

Suspension System	Main Runner	Cross Tees
1. Armstrong Prelude XL	7301	XL7342
2. USG Donn DX	DX26	DX424
3. Chicago Metallic Snap-Grid 200	200-01	204-01

- C. Grid Finish: White.

**2.3 ACCESSORIES – METAL SUSPENSION SYSTEMS**

- A. Metal grid suspension system accessories as required for a complete system including but not limited to moldings, stabilizer bars, splices, hold down clips, and light fixture clips.
- B. Wire hangers: ASTM A641/A641M, zinc-coated wire, Class 1, soft temper, pre-stretched, with a yield stress of at least 3 times the design load; sizes and gages as shown on the drawings and as specified in this Section.



- C. Support channels and hangers: Galvanized primed steel (minimum G40); size and type to suit application and to meet seismic requirements and as specified in this Section.

**2.4 ACOUSTICAL UNIT MATERIALS, TYPICAL SUSPENDED ACOUSTICAL CEILINGS**

- A. Ultima High NRC Series manufactured by Armstrong:
  - 1. Lay-in panels: 2 feet by 2 feet by 3/4 inch panels, beveled tegular edge.
  - 2. Properties
    - a. ASTM E1264: Type IV, form 2, pattern E
    - b. ASTM E84: Class A
      - 1) Flame spread: 25
      - 2) Smoke developed: 10
    - c. Noise Reduction Coefficient (NRC): 0.75
    - d. Ceiling Attenuation Class (CAC): 35
    - e. Surface color: White
    - f. Weight: 1.08 pounds per square foot
    - g. Thermal resistance (R): 2.2
    - h. Maintenance: Can be cleaned easily with a soft brush or vacuum.

**PART 3 EXECUTION**

**3.1 EXAMINATION**

- A. Examine job site conditions and verify field dimensions. Verify hangers will not interfere with other work.

**3.2 INSTALLATION – SUSPENDED CEILING METAL GRID**

- A. Install in accordance with CBC Section 803.9, approved shop drawings, and as specified in this Section.
- B. Install ceiling metal suspension system after major above ceiling work is complete. Coordinate location of hangers with other work.
- C. Hang suspension system independent of walls, columns, ducts, pipes and conduits.
- D. Use minimum 12 gage hanger wires for up to and including 4 feet by 4 feet grid spacing attached to main runners.
- E. Provide 12 gage hanger wires at the perimeter ends of all main and cross runners within 8 inches of the support or within 1/4 of the length of the end tee, whichever is least. End connections for runners which are designed and detailed to resist the applied vertical and

horizontal forces may be used in lieu of the 12 gage hanger wires.

- F. Provide trapeze or other supplementary support members at obstructions to typical hanger spacing. Provide additional hangers, struts or braces as required at all ceiling breaks, soffits, or discontinuous areas. Where hanger wires are more than 1 in 6 out of plumb, provide counter-sloping wires.
- G. Ceiling grid members may be attached to no more than 2 adjacent walls, and at least 1/2 inch free of other walls. Where walls run diagonally to ceiling grid system runners, one end of main and cross runner should be free, and a minimum 1/2 inch clear of wall.
- H. At ceiling perimeter area, where main or cross runners are not connected to adjacent walls, provide interconnection between runners at the free end to prevent lateral spreading. A metal strut or a 16 gage wire with positive mechanical connection to the runner may be used. Interlock is not required where perpendicular distance from the wall to the first parallel runner is 12 inches or less.
- I. Provide bracing assemblies consisting of a compression strut and four 12 gage splayed bracing wires oriented 90 degrees from each other. Splayed bracing wires shall be taut and shall not exceed 45 degrees from the ceiling plane. Splices in bracing wires are not permitted. Space bracing assemblies as follows:
  - 1. Not more than 1/2 of the spacing given above from the perimeter wall and at the edge of vertical ceiling offsets.
  - 2. Suspended acoustical ceiling systems with a ceiling area of 144 sq ft or less, and fire rated suspended acoustical ceiling systems with a ceiling area of 96 square feet or less, surrounded by walls which connect directly to the structure above, do not require bracing assemblies when attached to 2 adjacent walls.
- J. Fasten hanger wires with not less than 3 tight turns. Fasten bracing wires with 4 tight turns. Make all tight turns within a distance of 1-1/2 inches. Install hanger or bracing wire anchors to the structure in a manner that the direction of the wire aligns as closely as possible to the direction of the forces acting on the wire.
- K. Separate all ceiling hanging and bracing wires at least 6 inches from all unbraced ducts, pipes, conduit, etc.
- L. When drilled-in concrete anchors or shot-in anchors are used in reinforced concrete for hanger wires, 1 out of 10 shall be tested for 200 lbs tension. When drilled-in concrete anchors are used for bracing wires, 1 out of 2 shall be field tested for 440 lbs tension. Shot-in anchors in concrete are not permitted for bracing wires. Refer to CBC Section 1916A.8 if any shot-in or drilled-in anchor fails.
  - 1. Concrete Anchorage Requirements:
    - a. Anchorage to Concrete: Conform to requirements of CBC Chapter 19, Section 1912 "Anchorage to Concrete-Strength Design."
- M. Attach all light fixtures and ceiling mounted air terminals or services to the ceiling grid runners to resist a horizontal force equal to the weight of the fixtures. Screw or approved fasteners are required.
- N. Flush or recessed light fixtures and air terminals or services, weighing less than 56 lbs, may be supported directly on the runners of a heavy duty grid system. In addition, provide two 12

gage slack safety wires attached to the fixture at diagonal corners and anchored to the structure above. 4 feet by 4 feet light fixtures shall have slack wires at each corner.

- O. Flush or recessed light fixtures and air terminals or services, weighing 56 lbs or more shall be independently supported by not less than 4 taut 12 gage wires attached to the fixture and to the structure above. The 4 taut 12 gage wires, including their attachment to the structure above must be capable of supporting 4 times the weight of the unit.
- P. Support surface mounted light fixtures be at least 2 positive devices surrounding the ceiling runner and which are supported from the structure above be a 12 gage wire. Spring clips or clamps that connect only to the runner are not acceptable. Provide additional supports when light fixtures are 8 feet or longer.
- Q. Support pendant mounted light fixtures directly from structure above with hanger wires or cables passing through each pendant hanger and capable of supporting 4 times the weight of the fixture. A bracing assembly is required where the pendant hanger penetrates the ceiling.
- R. Do not eccentrically load suspended ceiling grid system or produce rotation of runners.
- S. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners; provide edge moldings at junctions with other interruptions.

### **3.3 INSTALLATION – LAY-IN CEILING TILES**

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Cut panels to fit irregular grid and perimeter edge trim. Double cut and field paint exposed edges of tegular units.
- D. Lay directional patterned units one way with pattern parallel to longest room axis. Fit border trim neatly against abutting surfaces.
- E. Install units after above ceiling work is complete.
- F. Install acoustical units level, in uniform plane, and free from twist, warp and dents.
- G. Install hold-down clips to retain panels tight to grid system within 10 feet of all exterior doors.

### **3.4 ERECTION TOLERANCES**

- A. Maximum variation from flat and level surface: 1/8 inch in 10 feet.
- B. Variation from plumb of grid members caused by eccentric loads: 2 degrees maximum.

### **3.5 CLEANING**

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish surface or surrounding construction

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 SECTION INCLUDES**

- A. Resilient Tile Flooring (LVT) and accessories.

### **1.2 SUBMITTALS**

- A. Product Data: Furnish manufacturer's product literature.
- B. Samples: Furnish samples of each type of flooring color and pattern.

### **1.3 PROJECT CONDITIONS**

- A. Ensure floor surfaces are smooth and flat with maximum variation of 1/8" in 10'-0".
- B. Ensure concrete floors are dry and exhibit negative alkalinity, carbonizing, and dusting.
- C. Maintain minimum 70-degree F air temperature at flooring installation area for three days prior to, during, and for 24 hours after installation.
- D. Store flooring materials in area of application; allow three days for material to reach same temperature as area.

## **PART 2 PRODUCTS**

### **2.1 LUXURY VINYL TILE**

- A. Acceptable Manufacturers
  - 1. Basis of Design: Tarkett, See Finish Schedule Legend for colors and patterns.

## **PART 3 EXECUTION**

### **3.1 PREPARATION**

- A. Conform to manufacturer's recommendations for preparation and to ASTM F710.
- B. Remove sub-floor ridges and bumps; fill low spots, cracks, joints, holes and defects with sub-floor filler.
- C. Clean floor and apply, trowel and float filler to leave smooth, flat hard surface; prohibit traffic until filler is cured.

### **3.2 INSTALLATION**

- A. Conform to manufacturer's recommendations and installation instructions.
  - 1. Open floor tile cartons, enough to cover each area, and mix tile to ensure shade variations do not occur within any one area.
  - 2. Clean substrate.

- B. Spread cement evenly in quantity recommended by manufacturer to ensure adhesion over entire area of installation; spread only enough adhesive to permit installation of flooring before initial set.
- C. Set flooring in place and press with heavy roller to ensure full adhesion.
- D. Lay flooring with joints parallel to building lines to produce symmetrical pattern.
- E. Install minimum 1/2 tile at room and area perimeter.
- F. Terminate resilient flooring at centerline of door openings where adjacent floor finish is dissimilar.
- G. Install edge strips at unprotected and exposed edges where flooring terminates.
- H. Scribe flooring to walls, columns, floor outlets and other appurtenances, to produce tight joints.
- I. Consult with Architect for floor pattern desired in each area.
- J. Edge Strips: Install where edge of tile would otherwise be exposed; butt to flooring without gaps; set in adhesive.

### **3.3 CLEANING AND PROTECTION**

- A. Remove excess adhesive from floor, base, and wall surfaces without causing damage.
- B. Clean, seal and wax floor surfaces in accordance with manufacturer's recommendation.
- C. Prohibit traffic from floor for 48 hours after installation.

**END OF SECTION**

## PART 1 GENERAL

### 1.1 SUMMARY

- A. Section Includes: Provide resilient base, and accessories as required for complete installation.

### 1.2 SYSTEM DESCRIPTION

- A. Performance Requirements: Provide materials tested under ASTM E648, Flooring Radiant Panel Test, with results of 0.45 watts/cm<sup>2</sup> or higher.

### 1.3 SUBMITTALS

- A. Product Data: Furnish manufacturer's product literature.
- B. Samples: Furnish samples of each base color and type.

### 1.4 PROJECT CONDITIONS

- A. Maintain minimum 70-degree F air temperature at installation area for 3 days prior to, during, and for 24 hours after installation.
- B. Store materials in area of application; allow three days for material to reach same temperature as area.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Resilient Base: Conform to FS SS-W-40, with premolded end stops and external corners; 1/8" gage; provide base at floor surfaces unless otherwise indicated.
  - 1. Type: Extruded rubber.
  - 2. Manufacturers: See Finish Schedule for Basis of Design product. Acceptable manufacturers include:
    - a. Johnsonite, Inc.
    - b. Burke
    - c. Or accepted equal.
  - 3. Base:
    - a. Johnsonite coved toe, 4".
      - 1) Provide base in 120' coils. 4' pieces are not acceptable.
    - b. Johnsonite Millwork base.
      - 2) Miter at all corners

4. Colors: Refer to Finish Schedule Legend in drawings for basis of design.
- B. Primers and Adhesives: Water-resistant nontoxic types recommended by base manufacturer for specified material and application.

### **PART 3 EXECUTION**

#### **3.1 INSTALLATION**

- A. Apply to walls, columns, pilasters, casework, and other permanent fixtures in rooms and areas where base is required.
  1. Fit joints tight and vertical; maintain minimum measurement of 18" between joints.
- B. Miter internal corners; use molded sections for external corners and exposed ends.
- C. Install base on solid backing, adhere tightly to wall and floor surfaces; fill voids along top edge of base with manufacturer's recommended adhesive filler.
- D. Scribe and fit to door frames and other obstructions.
- E. Install straight and level to variation of plus or minus 1/8" over 10'-0".

#### **3.2 CLEAN-UP**

- A. Remove excess adhesive from floor, base and wall surfaces without causing damage.
- B. Clean surfaces in accordance with manufacturer's recommendations.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 SECTION INCLUDES**

- A. Resilient Rubber Stair Treads and Risers.

### **1.2 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type of product indicated, in manufacturer's standard-size samples of each resilient product color, texture, and pattern required.

### **1.3 QUALITY ASSURANCE**

- A. Installation Qualification: Contractors for floor covering installation should be experienced in managing commercial flooring projects and provide professional installers, qualified to install the various flooring materials specified. An installer is "qualified" if trained, or a certified by manufacturer.

### **1.4 DELIVERY, STORAGE AND HANDLING**

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by Tarkett, but not less than 55 deg F (13 deg C) or more than 85 deg F (29 deg C).

### **1.5 PROJECT CONDITIONS**

- A. Install resilient products after other finishing operations, including painting, have been completed.
- B. Maintain ambient temperatures with range recommended by manufacturer, but not less than 65 deg F (18 deg C) or more than 85 deg F /29 deg C) in spaces to receive resilient products during the following time periods:
  - 1. 48 hours before installation
  - 2. During installation
  - 3. 48 hours after installation.
- C. Maintain the ambient relative humidity between 40% and 60% during installation.
- D. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.

## **PART 2 PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Tarkett, Inc.
- B. Or accepted equal.



## 2.2 ANGLE FIT RUBBER STAIR TREAD WITH INTEGRATED RISER.

- A. Basis-of-Design Product: Fastlane Tread/Riser
- B. Classification specify: ASTM F2169 Group 1, embedded abrasive strips
- C. Full width of stairs
- D. Colors and Patterns: Refer to Finish Schedule Legend in drawings.
- E. Test data:
  - 1. Hardness (ASTM D2240):  $\geq 85$  shore A
  - 2. Resistance to Chemicals (ASTM F925): Passes
  - 3. Resistance to Heat (ASTM F1514);  $\Delta E \leq 8$
  - 4. Static Coefficient of Friction (ASTM D2047):  $\geq 0.5$  SCOF
  - 5. Flamability (ASTM E648, Critical Radiant Flux): Class 1 ( $\geq 0.45$  w/cm<sup>2</sup>)
  - 6. Limited Commercial Warranty: 5 years

## 2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation.
- B. Adhesives: As recommended by manufacturer to meet site conditions.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affection performance of the work.
- B. Verify that finish of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale and foreign deposits that might interfere with adhesion of resilient products.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare substrates according to Tarkett written instructions to ensure proper adhesion of Resilient Flooring.
  - 1. Prepare concrete substrates in accordance with ASTM F710.
    - a. Concrete treads must be free of dust, solvent, paint, wax, oil, grease, residual adhesive, adhesive removers, film-forming curing compounds, silicate penetrating curing compounds, sealing, hardening or parting compounds, alkaline salts, excessive carbonation or laitance, mold, mildew, and other foreign materials that affect dissipation rate of moisture from the

concrete, discoloration or adhesive bonding.

- b. Mechanically remove contamination on the substrate that may cause damage to the resilient flooring material. Permanent and non-permanent markers, pens, crayons, paint, etc., must not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and stain the flooring material.
2. Wood subfloors must be rigid, free of movement.
    - a. Single wood and tongue and groove subfloors should be covered with  $\frac{1}{4}$ " (6.4 mm) or  $\frac{1}{2}$ " (12.7 mm) APA approved underlayment plywood.
    - b. Do not install over OSB (Oriented Strand Board), particle board, chip board, lauan or composite type underlayments.
  - B. Fill cracks, holes, depressions and irregularities in the substrate with good quality Portland cement-based underlayment leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
  - C. Do not install resilient products until they are same temperature as the space where they are to be installed.
    1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
  - D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

### 3.3 STAIR TREAD INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient stair treads.
- B. Install with Tarkett adhesive specified for the site conditions and follow adhesive label for proper use.
- C. Stair treads with Integral Riser use a cover filler strip where the tread meets the riser.

### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
  1. Remove adhesive and other blemishes from exposed surfaces.
  2. Sweep and vacuum surfaces thoroughly.
  3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
  1. No traffic for 24 hours after installation.

2. No heavy traffic, rolling loads, or furniture placement for 72 hours after installation.
- D. Wait 72 hours after installation before performing initial cleaning.
  - E. A regular maintenance program must be started after the initial cleaning.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Resilient Sheet Vinyl Flooring and accessories.

**1.2 SUBMITTALS**

- A. Product Information and Installation Instructions.
- B. Shop Drawings indicating seaming, edge conditions and transitions.
- C. Certification in writing by the manufacturer that the Flooring Contractor is approved for the installation of the Resilient Sheet Vinyl, accessories, and heat welding of all seams.
- D. Seven-year wear warranty.
- E. Manufacturer's written recommendations for maintenance of the Sheet Vinyl Flooring.

**1.3 PROJECT CONDITIONS**

- A. Store materials in warm, clean, dry enclosed space, protected from weather, maintained at a minimum temperature of 65° F (18° C) and a maximum temperature of 80° F (26° C) for 48 hours prior to installation.
- B. Maintain a minimum 65° F (18° C) and maximum 75° F (24° C) during installation of flooring and accessories, and for 48 hours after completion of the installation.

**PART 2 PRODUCTS**

**2.1 ACCEPTABLE MANUFACTURERS**

- A. AHF Contract.
- B. Or accepted equal.

**2.2 ACCESSORIES**

- A. Vinyl heat welding thread in matching colors.
- B. Subfloor filler and patching compound must be Portland based resin cement as recommended by the Flooring Manufacturer; with a minimum compressive strength of 4,000 psi in accordance with ASTM 349/157. Gypsum based fillers will not be allowed.
- C. Stainless Steel Drain Rings.
- D. Vinyl Reducing Strip equal to Mercer #700 or #705.

**2.3 COLOR**

- A. Refer to Finish Schedule Legend in drawings

**PART 3 EXECUTION**

**3.1 EXAMINATION**

- A. Verify that surfaces are smooth and flat and are ready to receive the sheet vinyl floor covering.
- B. Verify concrete substrate is dry in accordance with the Resilient Flooring Industry Standard ASTM E-96-80 Test Method for water Vapor Transmission: Maximum allowable 3 lbs/water/24 hours/1,000 sq. ft. by conducting moisture tests.
- A. Beginning of installation means acceptance of existing substrate and site conditions.

**3.2 PREPARATION**

- A. Remove sub-floor ridges and bumps. Remove paint, grease, oil, plaster dropping and other foreign materials. Fill low spots, cracks, joints, holes and other defects with specified sub-floor filler as recommended by the manufacturer.
- B. Prohibit traffic on area prepared until filler is cured.
- C. Sweep or vacuum substrate to remove all dust and dirt.
- D. Mechanically fasten Stainless Steel drain rings over all round drain outlets over the sheet vinyl. Drill into concrete to accommodate Red Head mollies manufacturer by HILTI Inc. Screw stainless steel rings tightly utilizing Red Head mollies. Stainless steel rings to be of a size to allow removal of clean-out grate.
- B. Install vinyl reducer as specified where required.

**3.3 INSTALLATION OF SHEET VINYL FLOORING**

- A. Install in accordance with manufacturer's instructions
- B. Mix and spread adhesive according to manufacturer's instructions.
- C. After setting flooring in place, roll with minimum 150 lb. roller to attain full adhesion.
- D. Terminate flooring at centerline of door at door openings where adjacent floor finish is dissimilar.
- E. Groove seams using manufacturer's approved grooving tool, to accommodate vinyl welding thread.
- F. Heat weld all seams with vinyl welding thread and trim flush to surface when rod has cooled. Do not attempt to heat weld any seams until after adhesive has completely dried.
- G. Flash cove all walls to 6".

**3.4 INSTALLATION OF ACCESSORIES**

- A. Install C9 cap strip to accommodate sheet vinyl to a height of 6" as indicated on the drawings using contact adhesive.
- B. Seal all other crevices around pipes, drains, etc. with sealant in a matching color to the vinyl flooring.

**3.5 CLEANING AND PROTECTION**

- A. Perform initial maintenance immediately upon completion of floor installation, removing any adhesive residue from the surface of the flooring.
- B. Sweep or vacuum floor thoroughly.
- C. Damp mop with warm water to remove soil. Green nylon pad with detergent is to be used to remove any marks.
- D. Protect floor against damage from rolling loads for 48 hours after the installation has been completed by covering with plywood or hardboard where rolling traffic will occur prior to the 48-hour period.
- E. Protect installed flooring with undyed, untreated building paper until floor has been inspected and accepted by County or Architect.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Walk-off Carpet (Tiles)
- B. Accessories.
- C. Vapor Emission and pH Testing.

**1.2 SUBMITTALS**

- A. Provide product data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of **installation including the manufacturer's maximum acceptable relative humidity (RH) percentage(s) and maximum pH level for each type and style of resilient flooring to be installed**. Indicate carpet tile pattern for each carpet material specified.
- B. Submit two samples 12 x 24 inch in size illustrating color and pattern for each carpet material specified. Indicate carpet tile pattern.
- C. Submit two samples of edge strips.
- D. Submit manufacturer's installation instructions.
- E. O&M Manuals
- F. Carpet Warranty

**1.3 OPERATION AND MAINTENANCE DATA**

- A. Submit operation and maintenance data.
- B. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning and shampooing.

**1.4 QUALITY ASSURANCE**

- A. Manufacturer: Company specializing in carpet with five years minimum experience.
- B. Installer: Company with five years minimum documented experience approved by manufacturer.

**1.5 REGULATORY REQUIREMENTS**

- A. Conform to ANSI/ASTM E648.

**1.6 ENVIRONMENTAL REQUIREMENTS**

- A. Store materials for three days prior to installation in area of installation to achieve temperature stability.
- B. Maintain minimum 70 degrees F ambient temperature three days prior to, during and 24

hours after installation of materials.

### 1.7 WARRANTY

- A. Walk-off Carpet Special Warranty: Lifetime commercial limited warranty.

### 1.8 EXTRA MATERIALS

- A. Provide 5% or 10 tiles of carpeting of each color and type specified, whichever is greater.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Per Interior Finish Schedule, or accepted equal.

### 2.2 ACCESSORIES

- A. Sub-Floor Filler: White premix latex; type recommended by carpet manufacturer.
- B. Primers and Adhesives: NuSprayLok as manufactured by Mohawk Commercial.
- C. Edge Strips: FlexCo. No. 163 with No. 101 track.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that substrate surfaces are smooth and flat with maximum variation of 1/8 inch in 10 ft and are ready to receive work.
- B. Verify concrete floors are dry to a maximum moisture content of 7 percent; and exhibit negative alkalinity, carbonization, or dusting.
- C. Beginning of installation means acceptance of existing substrate and site conditions.

### 3.2 PREPARATION

- A. Remove ALL defective materials, and foreign matter such as dust, adhesives, leveling compounds, paint, dirt, floor hardeners, bond breakers, oil, grease, curing agents, form release agents, efflorescence, laitance, etc.
- B. Remove sub-floor ridges and bumps. Repair all cracks, expansion joints, control joints, and open surface honeycombs and fill in accordance with manufacturer's recommendations.
- C. Apply, trowel, and float filler to leave smooth, flat, hard surface. **If a 'Water Vapor Emission Control System' is to be applied, install the barrier system prior to any sub-floor filler work.**
- D. Prohibit traffic until filler is cured.
- E. Vacuum floor surface.



**3.3 INSTALLATION OF WALK-OFF CARPET (TILE) FLOORING**

- A. Install using quarter turned method.
- B. Apply carpet and adhesive in accordance with manufacturers' instructions.
- C. Lay out carpet tiles for approval.
- D. Verify carpet tiles math before cutting to ensure minimal variation between dye lots.
- E. Locate change of color or pattern between rooms under door centerline.
- F. Cut and fit carpet tiles around interruptions.
- G. Fit carpet tight to intersection with vertical surfaces without gaps.

**3.4 CLEANING**

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean and vacuum carpet surfaces.

**3.5 PROTECTION**

- A. Prohibit traffic from carpet areas for 24 hours after installation.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes the following:
  - 1. Wood veneer and laminate wall panel.
  - 2. Accessories for wall installation.

**1.2 SUBMITTALS**

- A. Product Data:
  - 1. Provide manufacturer's technical data sheet and installation instructions for each type of wall panel required and/or specified.
- B. Samples:
  - 1. Provide three (3) samples, 12-inches long minimum, of each panel type and veneer type required and/or specified.
- C. Shop Drawings:
  - 1. Submit shop drawings, including details, for all walls. Coordinate wall layout, installation, and components with construction elements that penetrate walls or are supported by them. Show overall layout with dimensions and details for penetrations and intersections with other materials or building components.

**1.3 QUALITY ASSURANCE**

- A. Qualifications:
  - 1. Manufacturers: Provide wood wall panels from a single manufacturer with a minimum of five (5) years manufacturing panels.
  - 2. Installers: Utilize an installer having demonstrated minimum of three (3) years' experience on projects of comparable size and complexity.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to site in unopened factory packages labeled with manufacturer's name and identification of elements.
- B. Store wall covering in clean and dry area where temperatures are maintained at not less than 40 degrees F with normal humidity.
  - 1. Do not store in upright position.
- C. Take precautionary measures with adhesives and solvents to prevent fire hazards.

**1.5 PROJECT CONDITIONS**

- A. Ambient Conditions:
  - 1. Allow panels to reach room temperature, 50 to 86 degrees Fahrenheit. Stabilize moisture content, 25 to 55 percent relative humidity, for at least 72 hours before installation.
  - 2. Maintain ambient temperature and humidity conditions at levels indicated for the project when occupied for its intended use.
  - 3. Do not install products under environmental conditions outside manufacturer's recommended limits.
- B. Existing Conditions: Do not install wood wall panels until space is enclosed and weather proofed, wet work is completely dry, and work on walls is complete.

**1.6 WARRANTY**

- A. Provide manufacturer's standard written product warranty.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Basis of Design manufacturer: Acoustical Art Concepts, 391 Hickory Street, Mount Airy, NC 27030; Ph: (336) 786-6254, E-Mail: [marketing@interlam-design.com](mailto:marketing@interlam-design.com), Web: <https://acousticalartconcepts.com/>.
- B. Substitutions will be considered in accordance with the provisions in Section 01 60 00 Product Options.

**2.2 MATERIALS**

- A. Akupanel 3x1, resonance acoustic panel for sound absorption with real wood veneer (optional high-pressure laminate) including natural variations in color, grain, and texture.
  - 1. PET (polyethylene terephthalate) polyester fiber panels made from minimum 50-percent recycled plastic and 100-percent recyclable.
  - 2. Composed of Black PET Polyester Fiber, black thru-colored MDF and real wood veneer.
  - 3. Dimensions: 23.5/8-inches by 94.1/2-inches by 13/16-inch (600mm x 2400mm x 20mm).
  - 4. Materials: PET Polyester Fiber, MDF, Wood Veneer.
  - 5. Colors: See Finish Schedule Legend in drawings.
  - 6. Noise Reduction Coefficient of 0.52 at a frequency of 1000Hz.
- B. FIRE RATING

1. Test material in accordance with Standard ANSI/UL723 that determines the Surface Burning Characteristics of the material, specifically the flame spread, and smoke developed indices when exposed to fire.
2. The core material of the PET and the wooden substrate materials are rated Class A.
3. Akupanel 3x1 has a Flame Spread of 65 and a Smoke Index of 522 rating as Class B.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Ensure surfaces to receive wall covering are clean, true, and free of irregularities.
  1. Do not commence with work until surfaces are satisfactory.
  2. Proceeding with work is an indication of acceptance of the work surfaces.
- B. Ensure wall surface flatness tolerance does not vary more than 1/8 inch in 10 feet, nor vary at a rate greater than 1/16 inch per running foot.
- C. Schedule installation of wall covering as late in construction schedule as possible to prevent damage during construction.

#### **3.2 INSTALLATION**

- A. Panels may be installed on walls and/or ceilings as indicated on the drawings.
- B. Comply with manufacturer's instructions, recommendations, and industry standards for installation of wall panels.
- C. Coordinate the exact size, location, and sequencing of penetrations of wall panels by all building components.
- D. Lay out wall pattern per approved shop drawings if required. Where otherwise not indicated, lay out panels so margins on opposite sides of rooms are equal or greater than half (1/2) the panel width.
- E. Direct Application:
  1. Install panels on metal or wood furring channels installed directly to the wall or ceiling at 24-inches on center (609 mm), perpendicular to the panels. Attach panels to furring strips using 1/8-inch by 1.1/2-inch self-drilling screws between the strips through the PET fiber backing into the studs.
    - a. Optional: Install wall/ceiling panels directly to a gypsum board substrate.
  2. Provide a minimum of fifteen (15) black-anodized screws per panel.

**3.3 CLEANING**

- A. Clean surfaces of wall panels per manufacturer's instructions.
  - 1. PET: Spot clean using a mild water-free solvent, or dry-cleaning product.
  - 2. Slats/Facing: Wipe with a clean cloth and standard (non-chlorine and non-ammonia based) cleaner.
- B. Clean only in a well-ventilated room and avoid any product containing Carbon Tetra-chloride or other toxic materials. Do not use anything more abrasive than a cotton cloth on any part of the panel.

**3.4 PROTECTION**

- A. Protect installed work from damage due to subsequent construction activity, including temperature and humidity limitations and dust control, so work will be without damage and deterioration at the time of acceptance by the owner.
- B. Remove and replace damaged or discolored material and material that cannot be properly cleaned at no additional expense to the owner.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Fiberglass Reinforced Plastic Panels.
- B. Fiberglass Reinforced Laminate Panels.
- C. Accessories.

**1.2 SUBMITTALS**

- A. shop drawings include detail dimensions and trim and panel attachment details.
- B. Provide product data on panels, trim and adhesive.
- C. Submit two samples 6" x 6" in size illustrating panel material, color, and finish.
- D. Submit two samples 6" long in size illustrating trim material, color, and finish.
- E. Submit manufacturer's installation instructions.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Fiberglass Reinforced Plastic (FRP) Wall Panels:
  - 1. Manufacturers as described on Finish Schedule and Finish Schedule Legend, Sheet A900.
- B. Fiber Reinforced Laminate (FRL) Panel System:
  - 1. Manufacturers as described on Finish Schedule and Finish Schedule Legend, Sheet A900.
- C. Vinyl Moldings:
  - 1. To match each manufacturer.
- D. Caulking for FRL:
  - 1. Color Rite, Inc. (405.354.3644)
- E. Substitutions: Refer to Section 01 60 00.

**2.2 MATERIALS**

- A. Panels:
  - 1. Fiberglass reinforced plastic (FRP) panel system:
    - a. Thickness: 0.090" nominal thickness.

- b. Fire-Rating: Class I (UL Class A), maximum 25 flame spread, 450 smoke developed, ASTM E84.
  - c. Surface: Smooth surface as approved by Architect.
  - d. Color: See Finish Schedule Legend in drawings.
- B. Fiberglass Reinforced Laminate (FRL) panel system:
- a. Thickness: 0.088"
  - b. Size: 48" wide by up to 144" long
  - c. Fire-Rating: Rating of 25 or less per ASTM E84
  - d. Smoke Developed: 55, tested to ASTM E84
  - e. Colors & Patterns: See Finish Schedule Legend in drawings
- C. Primer: Provide non-staining nontoxic release coat primer as recommended by wall panel manufacturer where panels are applied to gypsum board.
- 1. Primer: Type designed to allow removal of wall paneling from gypsum board without damaging paper facing of board, and without premature separation of wall paneling from wall.
- D. Adhesive: Panel manufacturer's standard nontoxic, waterproof adhesive suitable for substrates indicated and for application indicated.
- E. Trim Pieces: Manufacturer's standard matching moldings and trim pieces as required for complete, finished installation, and as required for joints, corners and panel edges.
- F. Seam Treatment for FRL Only: Colored acrylic/silicone caulk. Color to match laminate.
- G. Mechanical Fasteners: Not permitted unless concealed.

## **PART 3 EXECUTION**

### **3.1 PREPARATION**

- A. All surfaces to receive FRP shall be properly prepared in strict accordance with manufacturer's specifications and as specified herein. Fill all pinholes, cracks and other surface imperfections with spackle and scrape off surface splatters and imperfections to leave substrate surfaces smooth and free of damage.
- B. All other trade work that penetrates substrate shall be completed before beginning FRP application.

### **3.2 APPLICATION**

- A. FRP shall be installed with adhesive supplied by or recommended by the FRP manufacturer.
- B. Apply FRP panels according to manufacturer's instructions. No horizontal seams will be permitted.

- C. Install trim in longest practicable lengths. "Piecing" of trim will not be allowed.
- D. Remove excessive adhesive from surfaces immediately.
- E. Ensure positive contact of FRP to adhesive material with all wall surfaces. Remove or replace damaged or improperly applied FRP.

**3.3 CLEAN-UP**

- A. Upon completion of the work of this Section, remove all surplus material, and debris from the premises.

**END OF SECTION**



**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Surface preparation.
- B. Painting schedules, including painting of all exposed surfaces, interior and exterior, except as otherwise specified or indicated.

**1.2 QUALITY ASSURANCE**

- A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with sufficient documented experience.
- B. Applicator: Company specializing in commercial painting and finishing with sufficient documented experience.
- C. Gloss Levels: Per Master Painters Institute (MPI) gloss standards "MPI Gloss and Sheen Levels," measured in accordance with ASTM D523.

GLOSS LEVEL	DESCRIPTION	GLOSS AT 60 DEGREES ASTM D523	SHEEN AT 85 DEGREES ASTM D523
G1	A traditional matte finish – flat.	5 units, maximum	and 10 units, maximum
G2	A high side sheen flat - "a velvet-like" finish.	10 units, maximum	and 10 - 35 units
G3	A traditional "eggshell-like" finish.	10 - 25 units	and 10 - 35 units
G4	A "satin-like" finish.	20 - 35 units	and 35 units, minimum
G5	A traditional semi-gloss.	35 - 70 units	-
G6	A traditional gloss.	70 - 85 units	-
G7	A high gloss.	More than 85 units	-

**1.3 REGULATORY REQUIREMENTS**

- A. Conform to CBC for flame spread and smoke density requirements for finishes.
- B. Furnish certification that all paint coatings furnished for the location of the project comply with the EPA clean air act for permissible levels of volatile organic content for architectural coatings applied in California as designated by California Air Resources Board (CARB).

**1.4 SUBMITTALS**

- A. Provide product data on all finishing products.
- B. Submit four brush-out samples 8 inches by 10 inches in size illustrating color selected for each surface finishing product scheduled.
- C. Field Sample: Furnish sample of actual paint colors selected on portion of building item to receive paint as directed by the County, prior to beginning interior and exterior painting.

**1.5 DELIVERY, STORAGE AND HANDLING**

- A. Deliver products to site in manufacturer's original unopened, labeled containers; inspect to verify acceptance.
- B. Store and protect products from abuse and contamination.
- C. Container labeling is to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation and instructions for mixing and reducing.
- D. Store paint materials at minimum ambient temperature of 50 degrees F and a maximum of 90 degrees F, in well-ventilated area, unless required otherwise by manufacturer's instructions.
- E. Take precautionary measures to prevent fire hazards and spontaneous combustion.

**1.6 ENVIRONMENTAL REQUIREMENTS**

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 50 degrees F for 24 hours before, during and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent, unless required otherwise by manufacturer's instructions.
- C. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior work and interior work, unless required otherwise by manufacturer's instructions.
- D. Provide lighting level of 80 foot candles measured mid-height at substrate surface.

**1.7 EXTRA STOCK**

- A. Provide a new and unopened five-gallon container of each type, color and sheen to County.
- B. Label each container with color, in addition to the manufacturer's label.

**PART 2 PRODUCTS**

**2.1 PAINT SYSTEMS, GENERAL**

- A. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

**2.2 ACCEPTABLE MANUFACTURERS – PAINT**

- A. Refer to Table at the end of this Section.

- B. Or accepted equal.

### **2.3 ACCEPTABLE MANUFACTURERS – PRIMER SEALERS**

- A. Refer to Table at the end of this Section.
- B. Or accepted equal.

### **2.4 MATERIALS**

- A. All paint materials shall be provided from a single manufacturer unless noted otherwise in this Section.
- B. Coatings: Ready mixed. Process pigments to a soft paste consistency capable of being readily and uniformly dispersed to a homogeneous coating.
- C. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.
- D. Accessory Materials: All other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

### **2.5 FINISHES**

- A. Refer to schedule at end of Section for surface finish schedule. Refer to Drawings for color schedule.

## **PART 3 EXECUTION**

### **3.1 INSPECTION**

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  - 1. Gypsum Wallboard: 18 percent.
  - 2. Concrete Masonry Units: 10 percent.
- D. Beginning of application constitutes acceptance of existing surfaces.

### **3.2 PREPARATION**

- A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or painting.
- B. Correct minor defects and clean surfaces that affect work of this Section.
- C. Seal marks that may bleed through surface finishes.

- D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- E. Gypsum Board Surfaces: Latex fill minor defects. Spot-prime defects after repair.
- F. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer, unless otherwise recommended by finish coating system manufacturer.
- G. Shop-Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces as recommended by primer manufacturer. Prime shop-primed steel items with steel primers specified in this Section.

### **3.3 PROTECTION**

- A. Protect elements surrounding the work of this Section from damage or disfiguration.
- B. Repair damage to other surfaces caused by work of this Section.
- C. Furnish drop cloths, shields and protective methods to prevent spray or droppings from disfiguring other surfaces.
- D. Remove empty paint containers from site.

### **3.4 APPLICATION**

- A. Apply products in accordance with manufacturer's instructions.
  - 1. Paint mil thicknesses shall not be less than the minimums recommended by the paint manufacturers.
- B. Do not apply finishes to surfaces that are not dry.
- C. Apply each coat to uniform finish.
- D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
- E. Sand lightly between coats to achieve required finish.
- F. Allow applied coat to dry before next coat is applied.

### **3.5 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT**

- A. See Divisions 21 – 23 and 25 – 28 for other items requiring painting.
- B. Paint interior surfaces of air ducts and convector heating cabinets that are visible through grilles and louvers with one coat of flat black paint, to limit of sight line. Paint dampers exposed behind grilles to match face panels. Paint all new interior and exterior exposed ductwork and ductwork supports. Paint all new conduit, pipes and conduit/pipe supports in exposed interior and exterior locations.
- C. Reinstall electrical plates, hardware, light fixture trim, and fittings removed for surface preparation or painting.
- D. Do not paint factory-finished mechanical and electrical equipment.

**3.6 CLEANING**

- A. As Work proceeds, promptly remove paint where spilled, splashed or spattered.
- B. During progress of Work, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials and debris.
- C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove from site daily.

**3.7 PAINTING SCHEDULE – EXTERIOR SURFACES**

- A. Ferrous Metal
  - 1. 1<sup>st</sup> coat – Zinc Primer
  - 2. 2<sup>nd</sup> and 3<sup>rd</sup> coats – Aliphatic Urethane Semi-Glass Enamel
- B. Galvanized Metal
  - 1. 1<sup>st</sup> coat – Etch Prep
  - 2. 2<sup>nd</sup> coat – Zinc Primer
  - 3. 3<sup>rd</sup> and 4<sup>th</sup> coats – Aliphatic Urethane Semi-Gloss Enamel

**3.8 PAINTING SCHEDULE – INTERIOR SURFACES**

- A. Gypsum Board
  - 1<sup>st</sup> and 2<sup>nd</sup> coats – PVA Primer Sealer
  - 3<sup>rd</sup> and 4<sup>th</sup> coats – Latex Semi-Gloss Enamel
  - Typical paint system at toilet rooms, storage rooms, kitchen.
- B. Gypsum Board
  - 1<sup>st</sup> and 2<sup>nd</sup> coats – PVA Primer Sealer
  - 3<sup>rd</sup> and 4<sup>th</sup> coats – Latex Eggshell Enamel
- C. Metal
  - 1<sup>st</sup> coat – Zinc Primer
  - 2<sup>nd</sup> and 3<sup>rd</sup> coats – Latex Semi-Gloss Enamel
  - Typical paint system at all hollow metal doors and frames.
- D. Masonry (CMU)
  - 1<sup>st</sup> coat – Acrylic Block Filler Primer
  - 2<sup>nd</sup> and 3<sup>rd</sup> coats – Waterborne Semi-Gloss Epoxy Paint
- E. Galvanized Metal, Zinc Alloy Metal and Aluminum
  - 1<sup>st</sup> coat – Etch Prep
  - 2<sup>nd</sup> coat – Zinc Primer
  - 3<sup>rd</sup> and 4<sup>th</sup> coats – Latex Semigloss Enamel

APPLICATION	TYPE	MPI Gloss Level	Dunn Edwards	Glidden Professional/ Devoe	Sherwin Williams	Kelly Moore	TNEMEC
<b>PRIMERS</b>							
Exterior Ferrous Metal	Zinc	G1					90-97
Exterior Galvanized Metal	Zinc	G1					90-97
Interior Masonry (Block Filler)	Acrylic	G1	W315	4000	B25W25	521	
Interior Gypsum Board	PVA	G1	W101	1030	B28W40 0	971	
Interior Ferrous Metal	Zinc	G1					18
Interior Galvanized Metal	Zinc	G1					18
<b>FINISHES</b>							
Exterior Ferrous and Galvanized Metal	Aliphatic Urethane Enamel	G6	Carbothane 134MC	379	B65 Series	-	
Interior Gypsum Board, Ferrous Metal, and Galvanized Metal	Latex Enamel	G5	SPMA50	1406	B31W25 1	1650	
Interior Gypsum Board	Latex Enamel	G3	SPMA30	1402	B20W25 1	1686	
Interior Masonry	Waterborne Epoxy	G5		WB4406	B70W21 1 and B60V25	7100	
<b>MISCELLANEOUS</b>							
Exterior Heavy Duty Cleaner	Water- Based	N/A		88		Jasco Prep & Prime	
Exterior & Interior Galvanized Metal Etch Prep	N/A	N/A					

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 SECTION INCLUDES**

- A. Liquid Chalk Writing Surfaces.
- B. Tackboards.
- C. Trim, marker tray and accessories.

### **1.2 SUBMITTALS**

- A. Shop drawings including wall elevations, dimensions, joint locations, special anchorage details. Method of attachment to structure shall be approved by Architect.
- B. Provide product data on markerboards, tackboards, trim and accessories.
- C. Submit two samples 4" x 4" in size illustrating markerboard and tackboard materials, finish, color, and texture.
- D. Submit manufacturer's installation instructions.

### **1.3 REGULATORY REQUIREMENTS**

- A. Conform to flame and smoke rating for markerboards and vinyl fabric covered tackboards in accordance with ASTM E84.

### **1.4 MAINTENANCE DATA**

- A. Include maintenance information on regular cleaning and stain removal.

## **PART 2 PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Claridge.
- B. PolyVision Corporation.
- C. ADP Lemco, Inc.
- D. Or accepted equal.

### **2.2 MATERIALS**

- A. Markerboards: Porcelain writing surface manufactured specifically for use with liquid marker systems.
  - 1. Core: Minimum 3/8" thick plywood.
  - 2. Balance porcelain writing surface with aluminum or sheet steel backing. Aluminum foil is not acceptable.
  - 3. Color: White.

4. Accessories: Provide manufacturer's standard accessories including marker tray, map hooks and projection screen hooks.
  5. Attachment Hardware: Manufacturer's standard fully concealed attachment system for securing units to wall surfaces.
- B. Tackboards, Basis of Design: Claridge 800 Series.
1. Tackboard Material: Cork, color to be selected by Architect.
  2. Aluminum Extrusions: ASTM B221, 6063 alloy, T-5 temper.
  3. Frame: 5/8 » Face, mitered corners, concealed fasteners.
  4. Adhesives: Type recommended by manufacturer.
  5. Splice Joint: Extruded aluminum `H' type, with fabric wrapped surface.

### **2.3 FINISHES**

- A. Porcelain Enamel: Glass-fibered enamel, baked to vitreous surfaces; Porcelain Enamel Institute Type A; color: as selected by Architect.
- B. Aluminum Frames and Accessories: Clear anodized finish.
- C. Tackboard Surface: Cork, color as selected by Architect.

## **PART 3 EXECUTION**

### **3.1 INSPECTION**

- A. Verify that surfaces and internal wall blocking are ready to receive work, and opening dimensions are as indicated on shop drawings.
- B. Beginning of installation means acceptance of substrate construction.

### **3.2 INSTALLATION**

- A. Install markerboards, tackboards where located on Drawings in accordance with manufacturer's instructions.
- B. Secure units level and plumb.

### **3.3 CLEANING**

- A. Clean markerboard and tackboard surfaces in accordance with manufacturer's instructions.

**END OF SECTION**



## PART 1 GENERAL

### 1.1 SECTION INCLUDES

- A. Exterior Signages.
  - 1. Accessibility Signage.
- B. Interior Signages.
  - 1. Accessibility Signage.
  - 2. Functional Room Signage.
- C. Life Safety Signages.

### 1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's descriptive literature and product specification for each product.
- B. Shop Drawings: Submit shop drawing for each sign and plaque to show construction, sections, character spacing and mounting details.
- C. Samples: Submit sign and plaque colors, designs and sizes as specified in this Section and as shown on the drawings for review.

### 1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section with a minimum 5 years.
- B. Regulatory Requirements:
  - 1. Accessibility Signage, General: Provide signage in accordance with CCR, Title 24, Part 2, Chapter 11B, CBC.
    - a. The International Symbol of Accessibility shall be the standard used to identify facilities that are accessible to and usable by physically disabled persons.
    - b. Finish, Color, and Contrast: Characters, symbols, and their backgrounds shall have a non-glare finish. Characters and symbols shall contrast with their background and unless otherwise noted, characters and figures shall be white on blue background. Blue shall be Color No. 15090 in accordance with FEDSTD 595B.
    - c. Proportions: Characters on signs shall have a width-to-height ratio between 3:5 and 1:1 and a stroke width-to-height ratio of between 1:5 and 1:10.
    - d. Braille Symbols: Comply with CBC 1117B.5.6. California Contracted Grade 2 Braille, 3/8 inch high. Dots shall be 1/10 inch on centers in each cell with 2/10 inch space between the cells, measured from the second column of dots in the first cell to the first column of dots in the second cell. Dots shall be raised a minimum of 1/40 inch above the background. Braille dots shall be domed or rounded.

2. Accessibility Signage:

- a. Tactile Exit Signage: Chapter 10 "Means of Egress," Section 1011 "Exit Signs," Article 1011.1 "Where Required," and Article 1011.3 "Tactile Exit Signs."
  - 1) Tactile signs required by Section 1011.3 need not be provided with illumination.
- b. Other Accessible Signage: Chapter 11B, "Accessibility to Public Buildings, Public Accommodations, Commercial Buildings and Publicly Funded Housing."
  - 1) Sanitary Facilities Signage: Section 1115B, "Bathing and Toilet Facilities (Sanitary Facilities)," Subsection 1115B.6, "Identification Symbols."
  - 2) Telephone Signage: Section 1117B, "Other Building Components," Subsection 1117B.2.9.3, "Signage."
  - 3) Detailed Requirements for Accessible Signage: Section 1117B, "Other Building Components," Subsection 1117B.5, "Signs and Identification."
    - a) Sign Finish: Subsection 1117B.5.2 "Finish and Contrast."
    - b) Sign Proportions: Subsection 1117B.5.3 "Proportions."
    - c) Sign Height: Subsection 1117B.5.4 "Character Height."
    - d) Raised and Pictorial Signs: Subsection 1117B.5.5 "Raised Characters and Pictorial Symbol Signs."
    - e) Braille Signs: Subsection 1117B.5.6 "Braille."
    - f) Sign Mounting: Section 1117B, Subsection 1117B.5.7 "Mounting Location and Height."
    - g) Symbols: Section 1117B, Subsection 1117B.5.8 "Symbols of Accessibility."
    - h) International Symbol of Accessibility: Section 1117B, Subsection 1117B.5.8.1 "International Symbol of Accessibility."
    - i) Entrance Signs: Section 1117B, Subsection 1117B.5.8.1.2 "Entrance Signs."
  - c. Field Inspection: Signs and identification shall be field inspected after installation and approved by the enforcing agency, in accordance with Section 1117B, Subsection 1117B.5.1.4.2 "Inspection."
3. Exit Signage: Provide signage in accordance with CCR, Title 24, Part 2, CBC, Chapter 10 "Means of Egress," Section 1011 "Exit Signs," as applicable to Occupancy Group.
  - a. Illuminated Exit Signs: Subsection 1011.1 "Where Required," Subsection 1011.2 "Illumination," Subsection 1011.4 "Internally Illuminated Exit Signs," and Subsection 1011.5 "Externally Illuminated Exit Signs."

C. Pre-Installation Meetings

1. Convene pre-installation meeting one week prior to commencing work of this Section.

2. Coordinate work in this Section with work in related Sections.

#### **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- B. Storage and Protection: Store materials in a dry secure place. Protect from weather, surface contaminants, corrosion, construction traffic, and other potential damage.

### **PART 2 PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers:
  1. Weidner Architectural Signage
  2. ASI-Modulex, Dallas
  3. Mohawk Sign Systems, Inc.
  4. Diverse ID
  5. Or accepted equal.

#### **2.2 MATERIALS**

- A. Acrylic Plastic: Non-glare finish acrylic with integral color as manufactured by Romark or accepted equal. Thickness shall be 1/4 inch at door mounted restroom signs and 1/8 inch minimum at all other locations, unless noted otherwise. Colors as selected by Architect from manufacturer's full range of colors.
- B. Aluminum: ASTM B209 for sheet or plate; ASTM B221 for extrusions, and ASTM B26/B26M for castings. Aluminum extrusions shall be 1/8 inch (3mm) thick minimum. Wall and post mounted panels shall be 0.080 inch thick minimum. Aluminum panels shall have an acrylic polyurethane paint finish.
- C. Anchors and Fasteners: Stainless steel conforming to ASTM F593.

#### **2.3 EXTERIOR SIGNAGE**

- A. Accessible Signage: Provide the following signages in accordance with ADAAG and CBC where indicated on Drawings.
  1. Entrance to Parking Lot Sign: 17 inches wide by 22 inches high (minimum) metal panel, reflectorized sign mounted on a single post with text "UNAUTHORIZED VEHICLES PARKED IN DESIGNATED ACCESSIBLE SPACES NOT DISPLAYING DISTINGUISHING PLACARDS OR LICENSE PLATES ISSUED FOR PERSONS WITH DISABILITIES MAY BE TOWED AWAY AT OWNERS EXPENSE. TOWED VEHICLES MAY BE RECLAIMED AT \_\_\_\_\_ OR BY TELEPHONING \_\_\_\_\_."
    - a. Blank Space Text: Coordinate text requirement for blank spaces with County.
  2. Accessible Parking Stall Sign: Provide a 12 inch wide by 18 inch high metal panel, reflectorized International Symbol of Accessibility sign, mounted on a single post, at

every accessible parking stall indicated on Drawings. The bottom of the sign shall be mounted 80 inches above the finish grade.

3. Van Accessible Parking Stall Sign: Provide a 12 inches wide by 18 inches high metal panel, reflectorized International Symbol of Accessibility sign, mounted on a single post for each van accessible parking stall as indicated on Drawings. Text shall occur below the symbol and read "RESERVED PARKING". Mounted on the same post, below this sign, a sign of the same width and required height shall display the text "VAN ACCESSIBLE". The bottom of the sign shall be mounted 80 inches above the finish grade. Refer to drawings for additional sign information.
4. Sign for Parking Violation Fine: An additional sign or additional language below the symbol of accessibility shall state "Minimum Fine \$250."
5. Accessible Route Signage: Provide where accessible route of travel diverges from the regular circulation path along or leading to an accessible route of travel, entrance or facility. Sign shall display the International Symbol of Accessibility, shall indicate the direction to accessible entrances and facilities, and shall comply with the requirements of CBC Sections 1117B.5.1 and 1117B. 5.8.1.
6. Building Entrance: Provide a 6-inch square International Symbol of Accessibility plaque for public entrances indicated on door schedule.
7. At Solid Wall Surfaces: Minimum 1/8 inch thick, non-glare finish acrylic with integral color and inlaid copy.
8. At Glass Surfaces: Vinyl decal applied to exterior surface of glass.
9. Functional Room Signage: Provide acrylic plastic room signage with inlaid characters raised 1/32-inch, upper case, sans serif type with corresponding California Contracted Grade 2 Braille. Raised characters shall be at least 5/8 inch high, but no higher than 2 inch. Color selections from manufacturer's full range of colors. Color contrast between characters/symbols and the background shall be 70% minimum per ADAAG 4.30.5.

## **2.4 INTERIOR SIGNAGE**

- A. Accessible Signage: Provide the following signages in accordance with ADAAG and CBC where indicated on the drawings:
  1. Material: Acrylic plastic.
  2. Color: White symbols and characters on contrasting background. Color contrast between characters/symbols and the background shall be 70% minimum per ADAAG 4.30.5. Colors as selected by Architect from manufacturer's full range of colors.
  3. Mounting Height:
    - a. Doors: Mount signs centered in the width of door 60 inches above the finished floor.
    - b. Walls: Mount signs on wall at 60 inches above the finished floor to the center line of sign on the latch side of the door where a person may approach within 3 inches of signage without encountering protruding objects or standing in the swing of the door.
  4. Restroom Signage:

- a. Unisex Restroom First Sign (door mounted): Provide for each unisex restroom door (where scheduled) a 12 inch diameter circle with an equilateral triangle superimposed within the circle. Provide a raised international symbol of accessibility, centered on the triangle, at restrooms equipped for the disabled. Triangle shall contrast with the circle a minimum of 70 percent.
  - b. Unisex Restroom Second Sign (wall mounted): Provide for each unisex restroom (where scheduled) 6 inch wide by 10 inch high acrylic plaque, 1/32-inch raised paired male and female pictogram (minimum 6 inch high) imprinted and centered at the top of the sign; 1 inch high by 1/32 inch raised text below the pictogram shall read "RESTROOM"; with corresponding Contracted Grade 2 Braille below the text. Provide 1/32-inch raised pictogram of the international symbol of accessibility beside the male and female pictogram at restrooms equipped for the disabled.
5. Tactile Exit Signage: Provide acrylic plaque tactile exit signs with at least 1 inch high but no higher than 2 inch high text and corresponding California Contracted Grade 2 Braille 3/8 inch below the text as follows:
- a. At each grade-level exit door with text "EXIT".
- B. Digital Cut Vinyl Door Graphics: Vinyl Sheet for Graphics: Precision cut with reflecting surface; 5 to 7 year premium type and shall be in accordance with flammability requirements of ASTM E84; minimum 0.003 inch (0.09 mm) film thickness. Film shall include a precoated pressure sensitive adhesive backing or positionable pressure sensitive backing.

## **2.5 FABRICATION**

- A. Work shall be assembled in the shop, as far as practical, ready for installation at the site. Work that cannot be shop assembled be trial fit in the shop to ensure proper field assembly.
- B. Drill or punch holes for bolts and screws; produce clean, true lines and surfaces.
- C. Acrylic signs shall have inlaid acrylic copy/characters and Braille symbols as described in this Section.
- D. Aluminum welding shall be in accordance with AWS D1.2. Steel welding shall be in accordance with AWS D1.1. Welding shall be continuous along the entire area of contact. Grind smooth exposed welds.
- E. Exposed work surfaces shall have a smooth finish and exposed riveting shall be flush. Fastenings shall be concealed where practical.
- F. Galvanized items shall be hot-dip process after fabrication if practical in accordance with ASTM A123/A123M.

## **2.6 SHOP FINISHING**

- A. Surfaces of miscellaneous metal work, except nonferrous metal, corrosion resisting steel, and zinc-coated work, shall be given one coat of zinc-molybdate primer or an accepted rust-resisting treatment and metallic primer in accordance with manufacturer's standard practice.
- B. Surfaces to be embedded in concrete shall not be painted.
- C. Upon completion of work, damaged surfaces shall be recoated.

**PART 3 EXECUTION**

**3.1 INSTALLATION**

- A. Install signs and plaques level and plumb.
- B. Mount sign posts directly into concrete foundation. Mount sign to post using tamper resistant mechanical fasteners as recommended by manufacturer and accepted by the Project Manager.
- C. Exterior Accessible Building Entrance Signs and Functional Room Signs: Mount to exterior door and wall surfaces using tamper proof mechanical fasteners suitable for the mounting substrate as recommended by the manufacturer and accepted by the Project Manager.
- D. Accessible Building Entrance Signs: Apply to exterior glass surfaces using vinyl decals.
- E. Interior Restroom Signs and Functional Room Signs: Mount to door and wall surfaces with tamper proof mechanical fasteners.

**3.2 ADJUST AND CLEAN**

- A. Clean and Touch-up: Remove all packing and protection blemishes and thoroughly clean and polish all finish surfaces. Restore any marred or abraded surfaces to their original condition by touching up in accordance with the manufacturer's recommendations. Touch-up shall not be obvious.
- B. Defective Work: Remove and replace all defective work that cannot be properly repaired, cleaned or touched-up, as directed by the Project Manager, with no additional cost to the County.
- C. Protect installed work during the construction period to prevent abuse and damage.

**3.3 CLEAN-UP**

- A. Upon completion of the work of this Section, remove all surplus materials, rubbish and debris from the premises.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. This section includes the following types of wall protection systems:
  - 1. Wall Covering.

**1.2 SUBMITTALS**

- A. Product Data:
  - 1. Product data and detailed specifications for each system component and installation accessory required, including installation methods for each type of substrate.
  - 2. Maintenance data for wall protection system components for inclusion in the operating and maintenance manuals specified in Division 1.
- B. Shop drawings:
  - 1. Showing locations, extent and installation details of wall covering products.
- C. Samples:
  - 1. Submit the following samples, as proposed for this work, for verification of color, texture, pattern and thickness:
  - 2. Sample of each product specified.
- D. Test Reports:
  - 1. Provide reports from a qualified independent testing laboratory showing compliance of each component with requirements indicated.

**1.3 FIELD MEASUREMENTS**

- A. Verify that field measurements are as indicated on drawings.

**1.4 QUALITY ASSURANCE**

- A. Installer qualifications: Engage an installer who has no less than 3 years' experience in installation of systems similar in complexity to those required for this project.
- B. Manufacturer's qualifications: Not less than 5 years' experience in the production of specified products and a record of successful in-service performance.
- C. Code compliance: Assemblies shall conform to all applicable codes including IBC, CBC, Life Safety, and CA 01350.
- D. Fire performance characteristics: Provide engineered PETG wall protection system components with UL label indicating that they are identical to those tested in accordance with ASTM E84 for Class A/1 characteristics listed below:

1. Flame spread: 25 or less
2. Smoke developed: 450 or less
- E. Impact strength: Provide wall protection components that have been tested in accordance with the applicable provisions of ASTM E695.
- F. Chemical and stain resistance: Provide wall protection system components with chemical and stain resistance in accordance with ASTM D543.
- G. Single source responsibility: Provide all components of the wall protection system manufactured by the same company to ensure compatibility of color, texture, and physical properties.

### **1.5 DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials to the project site in unopened original factory packaging clearly labeled to show manufacturer.
- B. Store materials in original, undamaged packaging in a cool, dry place out of direct sunlight and exposure to the elements. Maintain a minimum room temperature of 40 degrees F (4 deg. C) and a maximum of 100 degrees F (38 deg. C).
- C. Materials must be stored flat.

### **1.6 PROJECT CONDITIONS**

- A. Materials must be acclimated in an environment of 65 to 75 degrees F (18-24 deg. C) for at least 24 hours prior to beginning the installation.
- B. Installation areas must be enclosed and weatherproofed before installation commences.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Interior surface protection products specified herein and included on the submittal drawings shall be manufactured by Construction Specialties, Inc.
- B. Substitutions: See Refer to Section 01 60 00.

### **2.2 MATERIALS**

- A. Engineered PETG: Rigid sheet should be high-impact Acrovyn 4000 with standard Suede texture, nominal .060-inch (1.52 mm) thickness. Chemical and stain resistance should be per ASTM D543 standards as established by the manufacturer. Colors to be indicated in the finish schedule from one of manufacturer's available colors and patterns.
- B. Aluminum: Optional aluminum trim to be alloy 6063 T5 with clear or colored anodized finish, minimum strength, and durability properties as specified in ASTM B221. The colored anodized finish is available in eight colors as selected by Architect.

### **2.3 WALL COVERING**



- A. Engineered PVC FREE rigid sheet to be CS Acrovyn:
  - 1. Sheet Size: Suede Texture 4' x10' or 4' x 8'
- B. Finishes:
  - 1. Basis of Design: See Finish Schedule Legend in drawings.
- C. Clear caulk as needed for joints/transitions.

## **2.4 FABRICATION**

- A. General: Fabricate wall covering to comply with requirements indicated for design, dimensions, detail, finish, and sizes.

## **2.5 FINISHES**

- A. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applications and designations of finishes.

## **2.6 ACCESSORIES**

- A. Adhesive: Acrovyn wall covering shall be furnished as a complete packaged system, including appropriate standard adhesive.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- 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. Do not proceed until unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Surface preparation: Prior to installation, clean substrate to remove dirt, debris, and loose particles. Perform additional preparation procedures as required by manufacturer's instructions.
- B. Protection: Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions.

### **3.3 INSTALLATION**

- A. Install the work of this section in strict accordance with the manufacturer's recommendations using approved adhesive.
- B. Temperature at the time of installation must be between 65- and 75-degrees F (18-24 deg. C) and be maintained for at least 48 hours after the installation to allow for proper adhesive set-up.
- C. Relative humidity shall not exceed 80 percent.

- D. Do not expose wall covering to direct sunlight during or after installation. This will cause the surface temperature to rise, which in turn will cause bubbles and delamination.

**3.4 CLEANING**

- A. General: Immediately upon completion of installation, clean material in accordance with manufacturer's recommended cleaning method.
- B. Remove surplus materials, rubbish, and debris resulting from installation as work progresses and upon completion of work.

**3.5 PROTECTION**

- A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Toilet accessories.
- B. Attachment hardware.

**1.2 SUBMITTALS**

- A. Product Data: Submit data on accessories describing size, finish, details of function, attachment methods.
- B. Manufacturer's Installation Instructions: Submit installation instructions, special procedures, and conditions requiring special attention.

**1.3 KEYING**

- A. Master key all accessories.

**1.4 REGULATORY REQUIREMENTS**

- A. Conform to applicable code for installing work in conformance with Title 24 and Accessibility Requirements.
  - 1. Toilet accessories required to be accessible shall be mounted at heights according to CBC Section 1115B.8.
  - 2. Toilet paper and feminine napkin disposals located on the grab side of an accessible toilet room or stall shall not project more than the grab bar. The grab bar cannot project more than 3" into the 48" minimum clear space in front of the water closet per CBC 1115B.4.1.3. The accessory shall not be located closer than 1-1/2" clear of the tangent point of the grab bar.

**1.5 SEQUENCING AND SCHEDULING**

- A. Coordinate the work of this Section with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Bobrick.
- B. American Specialties, Inc.
- C. Bradley.
- D. Or accepted equal.

**2.2 MATERIALS**

- A. Stainless Steel Sheet: ASTM A167, Type 304.
- B. Tubing: ASTM A269, stainless steel.
- C. Fasteners, Screws, and Bolts: Hot dip galvanized, tamperproof.
- D. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

### **2.3 FABRICATION**

- A. Weld and grind smooth joints of fabricated components.
- B. Form exposed surfaces from single sheet of stock, free of joints.
- C. Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.
- D. Back paint components where contact is made with building finishes to prevent electrolysis.
- E. Shop assemble components and package complete with anchors and fittings.
- F. Provide steel anchor plates, adapters, and anchor components for installation.
- G. Hot dip galvanize exposed and painted ferrous metal and fastening devices.

### **2.4 FACTORY FINISHING**

- A. Stainless Steel: No. 4 satin luster finish.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that site conditions are ready to receive work and dimensions are as instructed by the manufacturer.
- B. Beginning of installation means acceptance of existing conditions.

### **3.2 PREPARATION**

- A. Deliver inserts and rough-in frames to site at appropriate time for building-in.
- B. Provide templates and rough-in measurements as required.
- C. Verify exact location of accessories for installation.

### **3.3 INSTALLATION**

- A. Install fixtures, accessories, and items in accordance with manufacturers' instructions.
- B. Install all items plumb and level.
- C. Secure all items rigidly in place. Anchor to structure with anchors appropriate for use with

type of adjacent construction. Fasteners shall securely fasten items to wall construction involved. Fasteners shall provide stiffness and rigidity to keep items square, in accurate position without twisting, buckling or warping. Fasteners to framing substrate shall be the following minimums; greater as required by the toilet accessory manufacturer or as conditions warrant:

1. Wood Framing: #14 wood screws by length as required to penetrate framing member 2" minimum.
2. Concrete/Masonry: #10 corrosion resistant screws 2-1/2" long with expansion shields.

**3.4 SCHEDULE**

A. Refer to drawings for items required at each space.

B. Basis of Design:

- |  |        |
|--|--------|
| 1. Soap Dispenser, Surface Mounted                             | B-2111 |
| 2. Toilet Tissue Dispenser, Surface Mounted                    | B-2740 |
| 3. Toilet Seat Cover Dispenser, Surface Mounted                | B-221  |
| 4. Sanitary Napkin Disposal, Surface Mounted                   | B-254  |
| 5. Paper Towel Dispenser and Waste Receptacle, Surface Mounted | B-3699 |
| 6. Grab Bar, see drawings for sizes                            | B-6806 |
| 7. Mirror, 24" x 36"   | B-290  |

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Fire Extinguishers.
- B. Cabinets.
- C. Accessories.

**1.2 SUBMITTALS**

- A. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets and location.
- B. Product Data: Provide extinguisher operational features, color and finish, and anchorage details.
- C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- D. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

**1.3 OPERATION AND MAINTENANCE DATA**

- A. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

**1.4 REGULATORY REQUIREMENTS**

- A. Conform to CFC Section 906 for requirements for extinguishers.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Acceptable Manufacturers and Products:
  - 1. J.L. Industries, Inc.
  - 2. Larsen's Manufacturing Co.
  - 3. Potter-Roemer
  - 4. Or accepted equal.

**2.2 EXTINGUISHERS**

- A. Dry Chemical Type, UL 299, five pound capacity, enameled steel tank, with pressure gage; minimum 2A-10B:C Rating.

**2.3 CABINETS**

- A. Semi-Recessed, Non-Security: Cosmopolitan Series, Model No. 1037W18 by J.L. Industries, Inc. Provide the named product or accepted equal with the following properties:
  - 1. Door and Trim: Formed sheet stainless steel.
  - 2. Trim Style: Rolled trim.
  - 3. Tub: Cold rolled steel with #4 satin stainless steel finish.
  - 4. Door Glazing: Laminated safety glass.
  - 5. Cabinet Hardware: Flush cabinet doors with 5/8" stop, attached by a continuous hinge; equipped with zinc-plated handle and roller catch.
  - 6. Cabinet Mounting Hardware: Appropriate to cabinet.
  
- B. Surface Mounted, Non-Security Cabinet, model 1039W18 by JL Industries. Provide the named product or accepted equal with the following properties.
  - 1. Door and Trim: Formed sheet stainless steel.
  - 2. Trim Style: Rolled trim.
  - 3. Tub: Cold rolled steel with #4 satin stainless steel finish.
  - 4. Door Glazing: Laminated safety glass.
  - 5. Cabinet Hardware: Flush cabinet doors with 5/8" stop, attached by a continuous hinge; equipped with zinc-plated handle and roller catch.
  - 6. Cabinet Mounting Hardware: Appropriate to cabinet.
  
- C. Fabrication:
  - 1. Form cabinet enclosure with right angle inside corners and seams. Form perimeter trim and door stiles.
  - 2. Pre-drill for anchors.
  - 3. Hinge doors for 180 degree opening with continuous piano hinge.
  - 4. Weld, fill and grind components smooth.
  - 5. Prepare security cabinets for mortise deadbolt.

**2.4 FIRE EXTINGUISHER WALL BRACKET**

- A. Wall Bracket: Model No. MB818C by J.L. Industries, Inc. Provide the named product or accepted equal with the following properties:
  - 1. Material: Steel.
  - 2. Finish: Powder coat paint; color: red.
  - 3. Fasteners: Tamper-proof security fasteners appropriate to wall bracket and wall

substrate.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify rough openings for cabinet are correctly sized and located.

#### **3.2 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Mount cabinets and wall brackets such that the fire extinguisher handle is at 48" maximum above the finished floor.
- C. Install cabinets and wall brackets plumb and level.
- D. Secure cabinets and wall brackets rigidly in place. Anchor to structure with anchors appropriate for use with type of adjacent construction. Anchorage shall securely fasten items to wall construction involved. Fasteners shall provide stiffness and rigidity to keep items square, in accurate position without twisting, buckling or warping. Fasteners to framing substrate shall be the following minimums; greater as required by the cabinet/bracket manufacturer or as conditions warrant:
  - 1. Metal Framing: Three-#10 self-tapping sheet metal screws each side of cabinet by length as required to penetrate framing member 1/4" minimum.
  - 2. Masonry: Masonry Anchors, 1/4 inch by 2 inch Torx concrete screws, hex washer head, Perma-Seal coated carbon steel.
- E. Place extinguishers in cabinets and on wall brackets.

**END OF SECTION**



**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Adjustable wall mount for flat panel TV monitor. Accessories including anchors and fasteners for installation.

**1.2 SUBMITTALS**

- A. Shop Drawings
  - 1. Indicate fabrication, materials, installation details, finishes, and any other required anchoring, fastenings, and hardware.
  - 2. Submit drawing layout for product configuration, support attachment and anchorage details.

**1.3 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Store in manufacturer's original unopened containers and packaging. Protect and handle products to prevent damage to products or finishes.

**PART 2 PRODUCTS**

**2.1 WALL MOUNT FOR FLAT PANEL TV MONITOR**

- A. Adjustable Wall Mount: Universal mount suitable for supporting flat panel TV monitors.
  - 1. Basis-of-Design Product: Model PDS-LWA by Video Mount Products (VMP)
    - a. Lucasey Manufacturing Corporation
    - b. Peerless Industries, Inc.
    - c. Or accepted equal.
- B. Adjustable Wall Mount Features:
  - 1. Maximum Load Capacity: 180 lbs.
  - 2. Color: Silver.
  - 3. Mounting Range: 42 inch to 63 inch flat panel TV monitors.
  - 4. Rotation: Up to 45 degrees.
  - 5. Tilt: -5 degrees to +15 degrees.
  - 6. Size: 38 inches by 13 inches.
  - 7. Depth of Mount: 4.3 inches from wall surface collapsed, 24 inches from wall surface fully extended.

- C. Provide fastener kit for metal studs as standard with manufacturer.

### **PART 3 EXECUTION**

#### **3.1 PREPARATION**

- A. Blocking and Backing: Verify mounting location; install blocking and backing as required by wall construction, and as recommended by manufacturer, for anchoring TV mount assembly.

#### **3.2 INSTALLATION**

- A. Products shall be installed according to manufacturer's printed instructions and as detailed on Drawings.
  - 1. Coordinate exact location of TV monitors with County.

#### **3.3 ADJUST AND CLEAN**

- A. Clean and Touch-up: Remove all packing and protection blemishes and thoroughly clean finish surfaces. Restore any marred or abraded surfaces to their original condition by touching up in accordance with the manufacturer's recommendations. Touch-up shall not be obvious.
- B. Defective work: Remove and replace all defective work which cannot be properly repaired, cleaned or touched up, as directed by Project Manager, at no cost to County.
- C. Protect installed work during the construction period to prevent damage.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Manually-operated shades where indicated.
  - 1. Roller shades and accessories.
  - 2. Shade fabric.
- B. Compliance with Project sustainable construction requirements includes familiarization with references for various sustainable construction requirements; Contract Documents do not include everything required by specified sustainability references.

**1.2 ADMINISTRATIVE REQUIREMENTS**

- A. Sequencing:
  - 1. Do not fabricate shades until field dimensions for each opening have been taken with finished conditions in place. "Hold to" dimensions are not acceptable.
  - 2. Do not install shades until final surface finishes and painting are complete.

**1.3 SUBMITTALS**

- A. Product Data – Manufacturer's catalog pages and data sheets for products specified including materials, finishes, dimensions, profiles, mountings, and accessories.
  - 1. Preparation instructions and recommendations.
  - 2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes, accessories, and operating instructions.
  - 3. Storage and handling requirements and recommendations.
  - 4. Mounting details and installation methods.
  - 5. Manufacturer's Instructions: Include storage, handling, protection, examination, preparation, and installation.
  - 6. Project Record Documents: Record actual locations of control system components and show interconnecting wiring.
  - 7. Operation and Maintenance Data: Component list with part numbers, and operation and maintenance instructions.
- B. Shop Drawings – Plans, elevations, sections, product details, installation details, operational clearances, and relationship to adjacent work.
- C. Verification Samples:
  - 1. For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements.
  - 2. Shadecloth Sample: Mark face of material to indicate interior faces.
    - a. Test reports indicating compliance with specified fabric properties.
    - b. Verification Samples: 6 inches (150 mm) square, representing actual materials, color and pattern.
- D. Warranty – Provide manufacturer's warranty documents as specified in this section.

**1.4 QUALITY ASSURANCE**

- A. Product Listing Organization Qualifications: As organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

- B. Manufacturer Qualifications: Obtain roller shades system through one source from a single manufacturer with a minimum of 10 years' experience and minimum of five projects of similar scope and size in manufacturing products comparable to those specified in this section.
- C. Installer for Roller Shade System - Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years' experience in installing products comparable to those specified in this section.
- D. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
- E. ShadeCloth Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC9644, ATCC9645.
- F. Environmental Certification: Submit written certification from the manufacturer, including third party evaluation, recycling characteristics, and perpetual use certification as specified. Initial submittals, which do not include the Environmental Certification will be rejected. Materials that are simply 'PVC free' without identifying their inputs shall not qualify as meeting the intent of this specification and shall be rejected.
- G. Third Party Evaluation: Provide documentation stating the shade cloth has undergone third party evaluation for all chemical inputs, down to a scale of 100 parts per million, that have been evaluated for human and environmental safety. Identify any and all inputs, which are known to be carcinogenic, mutagenic, teratogenic, reproductively toxic, or endocrine disrupting. Also identify items that are toxic to aquatic systems, contain heavy metals, or organohalogens. The material shall contain no inputs that are known problems to human or environmental health per the above major criteria, except for an input that is required to meet local fire codes.
- H. Recycling Characteristics: Provide documentation that the shade cloth can and is part of a closed loop of perpetual use and not be required to be down cycled, incinerated or otherwise thrown away. Scrap material can be sent back to the mill for reprocessing and recycling into the same quality yarn and woven into new material, without down cycling. Certify that this process is currently underway and will be utilized for this project.
- I. Perpetual Use Certification: Certify that at the end of the useful life of the shade cloth, that the material can be sent back to the manufacturer for recapture as part of a closed loop of perpetual use and that the material can and will be reconstituted into new yarn, for weaving into new shade cloth. Provide information on each shade band indicating that the shade band can be sent back to the manufacturer for this purpose.

### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and locations of installation using same room designations indicated on Drawings and in Window Treatment Schedule.
- B. Store and handle products per manufacturer's recommendations.

### **1.6 PROJECT CONDITIONS**

- A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

**1.7 WARRANTY**

- A. Roller Shade Hardware and Chain Warranty: Manufacturer's standard twenty-five year warranty.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Draper, Inc.
- B. Or accepted equal.

**2.2 ROLLER SHADES, MANUAL OPERATION AND ACCESSORIES**

- A. Basis-of-Design: Draper/Clutch Operated FlexShade System as manufactured by Draper, Inc.

**2.3 MANUALLY OPERATED WINDOW SHADES**

- A. Manually Operated Window Shades with Independent Control: Manually operated, vertical roll-up, fabric window shade with components necessary for complete installation.
  - 1. Operation: Bread chain and clutch operating mechanism allowing shade to stop when chain is released. Designed never to need adjustment or lubrication. Provide limit stops to prevent shade from being raised or lowered too far.
    - a. Bead chain loop: Stainless steel bead chain hanging at side of window.
    - b. Bead Chain Hold Down: P-Clip.
  - 2. Single Roller Configuration:
    - a. Mounting
      - 1.) Universal mounting brackets.
      - 2.) Endcaps and fascia.
      - 3.) Ceiling/Wall Style Headbox.
    - b. Brackets: Plated stamped steel. Provide size compatible with roller size.
      - 1.) Mounted to ceiling.
      - 2.) Mounted to wall.
      - 3.) Finish: White
    - c. Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size.
      - 1.) Endcap covers: To match fascia or headbox color.
    - d. Fascia: L shaped aluminum extrusion to conceal shade roller and hardware.
      - 1.) Attachment: Snaps onto endcaps without requiring exposed fasteners of any kind. Fascia can be mounted continuously across two or more shade bands. No notching is required.
      - 2.) Shape: Square Fascia Panel.
      - 3.) Finish: Selected from manufacturers standard range.
    - e. Headbox Ceiling/Wall Style: "L" shaped extruded aluminum back and top cover piece with removable extruded aluminum closure and stamped steel endcaps:
      - 1.) Finish: Selected from Manufacturers standard range.

3. Roller Tube: Fabricated from extruded aluminum, galvanized steel, or enameled steel. Diameter, wall thickness, and material selected by manufacturer to accommodate shade type and size. Minimum roller diameter 1.5 inches. Tube diameters less than 1.5 inches shall not be acceptable unless manufacturer provides deflection analysis showing deflection limited to  $\leq \text{width (inches)}/700$  at 1.5 X design load.
3. Fabric to tube attachments: LSE (low surface energy) double sided adhesive specifically developed to attach coated textiles to metal. Adhesive attachment to eliminate horizontal impressions in fabric.
4. Shade slat:
  - a. Closed pocket elliptical slat: 1 inch (25 mm) aluminum elliptical slat inside of a 1-5/8 inch (41 mm) pocket with heat sealed ends.
5. Interior cable guide kit.
  - a. Slat/hem bar is a 5/8-inch (16mm) round bar for use in a 1-5/8 inch (41mm) open-ended hem pocket.

### **2.3 FABRIC**

- A. Basis-of-Design: Draper Inc.: PVC Coated Fiberglass, SheerWeave Series SW2500 by Phifer
- B. Color and Pattern: As indicated on Finish Schedule and Finish Schedule Legend in Drawings

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

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

### **3.2 PREPARATION**

- A. Products shall be installed according to manufacturer's printed instructions and as detailed on Drawings.
- B. Coordinate requirements for blocking, construction of shade pockets, and structural supports to ensure adequate means for installation of window shades.

### **3.3 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install roller shades level, plumb, square, and true. Allow proper clearances for window operation hardware.
- C. Install the following items to conceal roller and operating mechanism. Do not use exposed fasteners.
  1. Fascias.

2. Closure panels.
  3. Endcaps.
- D. Install headbox, side channels, and sill channel with sealant to eliminate light leaks at perimeter of shade system.
- E. Position shades level, plumb, and at proper height relative to adjacent construction. Secure with fasteners recommended by manufacturer.

**3.4 TESTING AND DEMONSTRATION**

- A. Test window shades to verify that operating mechanism and other operating components are functional. Correct deficiencies.
- B. Demonstrate operation of shades to Owner's designated representatives.

**3.5 PROTECTION**

- A. Protect installed products until completion of project.
- B. Touch-up, repair, or replace damaged products before Substantial Completion.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Enclosed Vertical Wheelchair Lift.

**1.2 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include rated capacities, dimensions, performances, operations, safety features, controls, and finishes.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Include wiring diagrams for power, control and signal systems. Show complete layout of location of equipment, including required clearances and coordination with shaftway.
- C. Samples: For each finished product specified, provide two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- D. Certificates and Permits: Provide Owner with inspection and acceptance certificates and operating permits, as required by authorities having jurisdiction, for normal, unrestricted use of lifts.
- E. Maintenance data.

**1.3 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Firm with minimum 10 years experience in manufacturing of vertical platform lifts, with evidence of experience with similar installations of type specified.
- B. Installer Qualifications: Licensed to install equipment of this scope, with evidence of experience with specified equipment. Installer shall maintain an adequate stock of replacement parts, have qualified people available to ensure fulfillment of maintenance and callback service without unreasonable loss of time in reaching project site.
- C. Regulatory Requirements: In addition to requirements of authorities having jurisdiction, comply with ASME A18.1, "Safety Standard for Platform Lifts and Stairway Chairlifts Fittings."

**1.4 REGULATORY REQUIREMENTS**

- A. Provide platform lifts in compliance with:
  - 1. ASME A18.1 - Safety Standard for Platform Lifts and Stairway Chairlifts.
  - 2. ASME A17.1 - Safety Code for Elevators and Escalators.
  - 3. ASME A17.5 - Elevator and Escalator Electrical Equipment.
  - 4. NFPA 70 - National Electric Code
  - 5. 2022 California Building Code, Section 11B-410 Platform Lifts

**1.5 DELIVERY, STORAGE, AND HANDLING**



- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store components off the ground in a dry covered area, protected from adverse weather conditions.

**1.6 PROJECT CONDITIONS**

- A. Do not use wheelchair lift for hoisting materials or personnel during construction period.

**1.7 WARRANTY**

- A. Warranty: Provide a two-year limited warranty for wheelchair lift materials and workmanship.
- B. Extended Warranty: Provide an extended manufacturer's warranty covering the wheelchair lift materials and workmanship for the following additional extended period beyond the initial two-year warranty. Preventive Maintenance Agreement required.
  - 1. Five Years (7 years total).

**1.8 MAINTENANCE SERVICE**

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide twelve (12) months' full maintenance by skilled employees of lift Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
- B. Continuing Maintenance Service: Provide a continuing maintenance proposal from Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Basis of Design: Genesis Enclosure as manufactured by Garaventa Lift.
- B. Or accepted equal.

**2.2 ENCLOSED VERTICAL WHEELCHAIR LIFT**

- A. Capacity: 750 lbs. rated capacity.
- B. Mast Height:
  - 1. Model GVL-EN-144; 147 inches maximum lifting height.
- C. Nominal Clear Platform Dimensions:
  - 1. Standard: 37-1/4 inches by 54 inches.
- D. Platform Configuration:
  - 1. On/Off Same Side Entry/Exit: One front opening only.

- E. Landing Openings:
  - 1. Lower Landing: Door.
  - 2. Upper Landing: Gate.
- F. Doors and Gates: Doors and gates shall be self-closing type.
  - 1. Door Height: Flush mount, 80 inches.
  - 2. Gate Height: Flush mount, 42-1/8 inches.
  - 3. Door Construction: Aluminum frame with panels of 16-gauge painted galvanized steel.
  - 4. Power Door/Gate Operator: Automatically opens the door/gate when platform arrives at a landing. Will also open at landing by pressing call button.
    - a. Locations: Lower Landing: Door. Upper landing: Door or Gate.
- G. Lift Components:
  - 1. Machine Tower: aluminum.
  - 2. Base Frame: Structural steel.
  - 3. Platform Side Wall Panels: 42-1/8 inches high. 16-gauge galvanized steel sheet. Aluminum extrusion tubing frame.
  - 4. Enclosure Panels: 16-gauge painted galvanized steel sheet.
- H. Enclosure Height Above Upper landing:
  - 1. Enclosure shall extend 42-1/8 inches above the upper landing level
- I. Infill Panel Kit: Provide 16-gauge galvanized panels and mounting hardware to cover void between side of enclosure, drive mast and adjacent wall at lower landing and upper landing.
- J. Base Mounting and Access to Lift at Lower Landing:
  - 1. Pit Mount: Lift to be mounted in pit with dimensions to meet manufacturers requirements for the platform size specified.
- K. Hydraulic Drive:
  - 1. Drive Type: Chain hydraulic.
  - 2. Emergency Operation: Manual device to lower platform and use auxiliary battery power to raise or lower platform.
  - 3. Safety Devices:
    - a. Slack chain safety device.
    - b. Shoring device.

4. Travel Speed: 17 fpm (5.2 m/minute).
  5. Motor: 3.0 hp (2.2 kW); 24 volts DC.
  6. Power Supply:
    - a. 120 VAC single phase; 60 Hz on a dedicated 15-amp circuit.
    - b. Powered by building continuous mains converted to 24 VDC and equipped with auxiliary battery backup power system capable of running lift up and down for a minimum of 5 trips with rated load. Required for high use lifts and lifts equipped with a fan and ventilation system.
- L. Platform Controls: 24 VDC control circuit with the following features.
1. Direction Control: Illuminated tactile and constant pressure push buttons with dual platform courtesy lights and safety light.
  2. Illuminated and audible emergency stop switch shuts off power to lift and activates audio alarm equipped with battery backup.
  3. Keyless operation.
  4. Emergency Telephone: Platform shall be equipped with ADA compliant auto dialer telephone with a stainless-steel faceplate. Telephone shall operate in the event of power failure. A telephone line shall be supplied to the lift site as specified under Division 16.
  5. Arrival Gong and Digital Floor Display.
- M. Call Station Controls: 24 VDC control circuit with the following features.
1. Direction Control: Illuminated tactile and constant pressure push buttons with illuminated "In Use" indicator.
  2. Keyless operation.
  3. Lower and upper call station shall be frame mounted.
- N. Safety Devices and Features:
1. Grounded electrical system with upper, lower, and final limit switches.
  2. Tamper resistant interlock to electrically monitor that the door is in the closed position and the lock is engaged before lift can move from landing.
- O. Finishes
1. Aluminum Extrusions: Electrostatically applied baked powder finish Fine Textured Silver Moon (RAL 7047).
  2. Lift Finish: Baked powder coat finish, color as selected by the Architect from manufacturers optional RAL color chart.

**PART 3 EXECUTION**

**3.1 EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify shaft and machine space are of correct size and within tolerances.
- C. Verify required landings and openings are of correct size and within tolerances.
- D. Verify electrical rough-in is at correct location.
- E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

**3.2 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.

**3.3 INSTALLATION**

- A. Install lifts in accordance with applicable regulatory requirements including ASME A 17.1, ASME A 18.1 and the manufacturer's instructions.
- B. Install lifts in accordance with applicable regulatory requirements including CSA B355, and manufacturer's instructions.
- C. Install system components and connect to building utilities.
- D. Accommodate equipment in space indicated.
- E. Startup equipment in accordance with manufacturer's instructions.
- F. Adjust for smooth operation.

**3.4 FIELD QUALITY CONTROL**

- A. Perform tests in compliance with ASME A 17.1 or A18.1 and as required by authorities having jurisdiction.
- B. Perform tests in compliance with CSA B355 and required by authorities having jurisdiction.
- C. Schedule tests with agencies and Architect, Owner, and Contractor present.

**3.5 PROTECTION**

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

**END OF SECTION**

**PART 1 – GENERAL**

**1.1 INCLUDED**

- A. This Specification establishes the required standards for all labor, materials, equipment, and workmanship in connection with the furnishing, fabrication, and installation of "Plumbing." Plumbing work includes, but is not limited to, the following items of work:
1. A complete system of soil, waste, vent, and sanitary sewer piping and structures, including provisions for mechanical equipment drainage; and connection of same to public sanitary sewers, located as indicated on the Drawings.
  2. Cold water distribution system, complete, from points of contact with site domestic water systems (located approximately as indicated on the Drawings) to all plumbing fixtures, mechanical equipment, building specialties, and Owner supplied equipment scheduled for service on the Drawings.
  3. Hot water distribution system, complete, from serving water heaters and/or points of contact with site domestic hot water, to all plumbing fixtures, mechanical equipment, building specialties, and Owner supplied equipment schedule for service on the Drawings.
  4. All plumbing fixtures and trim as scheduled on the Drawings, inclusive of setting of Fixtures and connections to drainage and water supply systems.
  5. Flashing of all plumbing pipe penetrations through exterior walls, roofs, and foundations. Sheet metal and lead flashings for pipe penetrations through roofs shall be furnished by the Plumbing Contractor and installed by the appropriate Roofing Contractor.
  6. Excavation and backfill as required for the work of this Section in conformity with Earthwork Section of the Specifications.
  7. Rough in and connection of all fixtures and equipment furnished by the Owner and/or Tenant.
  8. Final connection of water and natural gas to equipment furnished under other Sections.
  9. Protection of all piping specified herein and/or shown on the Drawings, from freezing. Buried piping shall be a minimum 12" below the local front line. Piping above grade in unconditioned areas shall be insulated.
  10. Testing and adjusting of all piping systems and equipment herein specified.
  11. Sterilization of domestic water systems.
  12. Pipe wrapping and insulation.
- B. The bidding requirements and contract forms, including General Conditions and Supplemental General Conditions, all Division 01 Sections apply to all work herein.
- C. Should any work or material not be included in the Drawings or Specifications but it nevertheless necessary for the proper execution of the stated scope therefore for full compliance with codes, laws, rules, and regulations, the Contractor shall understand such work and material is required, and shall perform all such work.

**1.2 LICENSES, PERMITS, AND FEES**

- A. The Contractor shall provide, procure, and pay for all licenses, permits, fees, etc. as required to carry on and complete their work.

**1.3 CODES AND STANDARDS**

- A. All work shall be done in code with all applicable local, state, and federal building safety codes, ordinances, and regulations. Additionally, all work shall conform to the latest editions of the following standards:
  - 1. National Fire Protection Association.
  - 2. California Mechanical Code.
  - 3. California Plumbing Code.
  - 4. Underwriters Laboratories.
  - 5. Titles 8, 17, 19, 21, 24 of the California Code of Regulations.
  - 6. California Electric Code.
- B. When the Contract Documents call for materials or construction of a higher standard than is required by the above, the Contract Document requirements shall take precedence over the requirements of the applicable laws, ordinances, rules, or regulations. Nothing in the Contract Documents shall be interpreted as permitting work in violation of said laws, rules, and/or regulations.
- C. The Contractor for this work shall furnish, without extra charge, any additional materials and/or labor as may be required for compliance with these laws, rules, and/or regulations though such materials and/or labor are not specially set forth in the Contract Documents.

**1.4 LICENSING REQUIREMENTS**

- A. All plumbing systems shall be installed by a C-36 Plumbing Contractor. Plumbing systems include: waste removal and connection of on-site waste disposal systems; piping, storage tanks, and venting for supply of gases and liquids for any purpose; all gas appliances, flues, and gas connections; water and gas piping from the Owner's side of utility meter to the structure or fixed works, installation of any type of equipment to heat water or fluids to a suitable temperature; and maintenance and replacement of the items described above, including health and safety devices.
- B. All hydronic piping systems shall be installed by a C-4 – Boiler, Hot Water Heating and Steam Fitting Contractor.
- C. All plumbing and hydronic piping insulation shall be performed by a C-2 – Insulation and Acoustical Contractor.

**1.5 SUBMITTALS**

- A. All fixtures, materials, and equipment equal in quality and utility to these herein mentioned will be accepted. When specific names are used in describing fixtures, materials, and equipment they are mentioned as standards only, but this implies no right on the part of the Contractor to

use other fixtures, material, and equipment or methods, unless approved as equal in quality and utility by the Architect.

- B. Before any fixtures, materials, or equipment are purchased, the Contractor shall submit to the Architect for approval, a complete list of materials, fixtures, and equipment, giving the manufacturer's names, model numbers, and catalog sheets.
- C. The Contractor shall submit for the approval of the Architect, shop drawings of proposed material and equipment that differ from the specified materials and equipment, and of any specified materials and equipment with special conditions and/or arrangements. These drawings shall show necessary modifications of owner, plumbing, electrical, and mechanical work required by the proposed materials and equipment.
- D. Submittal lists and drawings shall include identifying marks assigned by the Drawings and Specifications.
- E. Review of drawings and other material submitted shall not be construed as complete check or constitute a waiver of the requirements of the Drawings and Specifications, but will indicate that the material submitted is acceptable in quality and utility. This review shall not relieve the Contractor of the responsibility to fit the proposed materials to the spaces provided, and to effect necessary rearrangements or construction of other work.

#### **1.6 COOPERATION WITH OTHER TRADES**

- A. Cooperate fully with other trades doing work on the project as may be necessary for the proper completion of the project. Refer to the Structural, Mechanical, and Electrical Drawings for details of the building structure and equipment installation that will tend to overlap, conflict with or require coordination with the work of this Section, and schedule this work accordingly.
- B. Any work done without regard for other trades shall be moved, replaced, or redone as required, without extra charges to Owner.

#### **1.7 AS-BUILT DRAWINGS**

- A. A complete set of Contract Drawings shall be maintained at the work site, and all changes in the work shall be recorded on this set, on a daily basis. The final as-built drawings shall be submitted to the Owner's Representative for approval.

#### **1.8 DRAWINGS**

- A. The drawings indicate diagrammatically the general layout of the plumbing systems and other related work. Field verification of scaled dimensions taken from the Drawings is required.
- B. The Contractor shall review and compare the Architectural, Structural, Plumbing, Mechanical, and Electrical Drawings and all Owner supplied equipment Drawings, and adjust their work to be in conformity with the conditions indicated thereon. Discrepancies between drawings, between drawings and actual field conditions, or between Drawings and Specifications, shall promptly be brought to the attention of the Architect for a determination of the modifications to be effected. In the event that a major modification is required, a Change Order will be prepared.

#### **1.9 VERIFICATION OF EXISTING CONDITIONS AND DEMOLITION**

- A. Before installation of any new work, verify the location, size, and other conditions at all points of connection to services or other existing piping, and at all locations where new work will cross or pass near existing piping, electrical, or other facilities.

- B. Patch, cap, or repair existing works affected by this demolition in concealed spaces within six (6) inches of a live main or branch.
- C. Deliver removed material to the Owner as directed by the Architect. Dispose of all other removed material offsite.
- D. Information shown relative to existing services is based upon available records and data during preparation of the Drawings, but shall be verified. Make reasonable deviations found necessary to conform to actual locations and conditions, without extra charge.
- E. The data given herein and on the Drawings are as exact as could be reasonably secured, but absolute accuracy is not guaranteed. Exact locations, distances, elevations, etc. will be governed by shop drawings, the building itself, and actual field conditions.

**1.10 DAMAGE BY LEAKS**

- A. Contractor shall be responsible for any damage to work of other Contractors that is caused by leaks in any temporary or permanent piping systems due to pipe rupture, disconnected pipes or fittings, or by overflow of equipment.

**1.11 SEISMIC FORCE RESISTANCE: MECHANICAL, PLUMBING, FIRE PROTECTION SYSTEMS**

- A. All mechanical systems and plumbing piping systems shall adhere to the SMACNA "Seismic Restraint Manual: Guidelines for Mechanical Systems," Third Edition, dated March 2008.
- B. Equipment:
  - 1. Each piece of equipment installed shall be constructed and anchored to structural supports to resist a seismic force of 150% of the equipment's operating weight in any direction. Supports, anchors, and braces shown shall be minimum.
  - 2. Equipment manufacturer shall design, construct, and certify that his equipment satisfies the special minimum seismic resistance requirements and shall submit calculations or test results supporting his certification.

**1.12 DELIVERY, STORAGE, AND HANDLING**

- A. Contractor shall be responsible for delivery, storage, protection, and placing of all equipment and materials.
  - 1. Contractor shall protect the work and materials from damage during construction. Equipment stored at the job site shall be protected from dust, water, or other damage, and be covered if equipment is exposed to weather. Protect interiors of new equipment and piping systems against entry of foreign matter. Clean both inside and outside before painting or placing equipment in operation.
  - 2. Any items damaged shall be repaired or replaced, at no additional cost to the Owner.
- B. Cleanliness of Piping and Equipment Systems
  - 1. Exercise care in storage and handling of equipment and piping material to be incorporated in the work. Remove debris arising from cutting, threading, and welding of piping.
  - 2. Piping systems shall be flushed, blown, or pigged as necessary to deliver clean systems.



3. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

### **1.13 WARRANTIES**

- A. Equipment warranties shall be provided for all equipment, with all necessary information filled in, except purchase date, in favor of the Owner.
- B. The contractor shall guarantee that all work under this Section is free from defects in material and workmanship for a period of one year from the date of filing the Notice of Completion. Replacement of defective work and damage caused to work of other trades as a result of such defective work shall be the responsibility of the Contractor, and shall be made at no cost to the Owner.

### **1.14 ALTERNATIVE MATERIALS AND METHODS**

- A. These plans and specifications describe the general scope of the plumbing systems. These plans and specifications do not preclude the submittal of alternative methods or materials. Manufacturer's names and catalog numbers are stated to identify the type and quality of the equipment or materials required for the project.
- B. The contractor may submit shop drawings and/or technical information on alternative equipment, materials or installation details to accomplish the intent of the plans and specifications. Approval of the alternative equipment, materials or installation details shall not relieve the contractor of any responsibility for complying with the intent of the plans and specifications. Submit the manufacturers' technical information, shop drawings, and/or written description of alternative methods for each item described by manufacturer's name and catalog number and for each component, equipment, material, or installation detail required.

### **1.15 SITE EXAMINATION**

- A. Thoroughly examine the site and verify the actual work conditions. No extra compensation will be allowed for expenses due to failure to discover site conditions which affect the work.

## **PART 2 – PRODUCTS**

### **2.1 GENERAL**

- A. Only specified material shall be utilized in the work of this Section unless substitutions have been approved in accordance with the General Conditions and Division 1 Sections of the Specifications.
- B. All materials shall be new and unused, of the best quality for the intended use, and shall be listed by the ASA, AGA, and UL as meeting their requirements and bearing their label wherever standards have been established and label services are regularly furnished by them.

### **2.2 PIPE AND FITTINGS**

- A. Sanitary Soil, Waste, and Vent Piping:
  1. Below Ground

- a. Lines 2" and larger shall be service weight, hub-less cast iron soil pipe and fittings, and shall conform to the requirements of ASTM A 888 and CISPI Standard 301. Approved manufacturers: Charlotte, Tyler, or AB&I.
  - b. Joints: Couplings shall conform to the requirements of ASTM C1540 and shall be heavy duty type 304 stainless steel shielded, having 4 sealing clamps for pipe sizes 1 1/2" thru 4", and 6 sealing clamps for pipe sizes 5" thru 10". Gaskets shall comply with ASTM C-564. Anaco, Tyler, or equal.
2. Above Ground
- a. Lines 2" and larger shall be standard weight, hub-less cast iron soil pipe and fittings, and shall conform to the requirements of ASTM A 888 and CISPI Standard 301. Approved manufacturers: Charlotte, Tyler, or AB&I.
  - b. Joints: Couplings shall conform to the requirements of ASTM C1540 and shall be heavy duty type 304 stainless steel shielded, having 4 sealing clamps for pipe sizes 1 1/2" thru 4"; and 6 sealing clamps for pipe sizes 5" thru 10". Gaskets shall comply with ASTM C-564. Anaco, Tyler, or equal.
- D. Cold and Hot Water Piping
- 1. All domestic cold water piping 3" and smaller shall be Type L, hard temper, copper pipe with wrought copper or cast brass solder joint fittings. All joints shall be made up with "Stay-Safe 50" lead free solder. A suitable non-corrosive flux shall be used at all joints.
  - 2. Pipes below grade inside buildings shall be soft drawn, Type L or K copper with no joints below slabs. Pipes shall be installed in a PVC conduit not less than Schedule 40. The interior diameter of the conduit shall not be less than 1/2 inch larger than the outside diameter of the water piping.

### **2.3 UNIONS**

- A. Steel pipe unions shall be malleable iron, 150lb., ground joint, Grinnell Fig. 463.
- B. Copper pipe unions shall be soldered joint, Nibco series 633 or 733, Mueller, or equal.
- C. Dielectric unions shall be EPCO or equal.

### **2.4 VALVES, SPECIALTIES**

- A. Ball Valves, Potable Water up to 2": Nibco T-585-80-LF, lead-free silicon bronze body, "Ring Ball," full port, two piece, lever handle, 125 lb.
- B. Ball Valves, Potable Water over 2": Nibco T-580-80-LF, lead-free silicon bronze body, "Ring Ball," conventional port, two piece, lever handle, 125 lb.
- C. Check Valves, Potable Water:
  - 1. Nibco T-480-LF, lead-free silicon bronze body, inline lift type, Teflon seat, and discs, spring actuated, 125 lb.
  - 2. Nibco T-413-Y-LF, lead-free silicon bronze body, Y-pattern lift type, Class 200.
- D. Gate Valves: 3" and smaller shall be NIBCO T134 or Stockham B-120 or B-124, bronze body, union bonnet, rising stem, solid wedge, 150 lb. with wheel handle.

- E. Relief Valves: Water heater temperature/pressure relief valve, Watts, M&M, or equal with ASME rating, and AGA certified design. Set at 125 psi and 210°F.
- F. Backflow Preventers (where shown on the Drawings or required by local code):
  - 1. Atmospheric type; Wilkins #35 series.
  - 2. Pressure type: Wilkins #720A series.
  - 3. Reduced pressure type:
    - a. 1/4" to 2" – Wilkins #975-XLMS series.
    - b. 2 1/2" to 10" – Wilkins #375 series.
- G. Water Pressure Regulating Valves: Wilkins 500 YSBR series. Install where pressure to building exceeds 70 psi.

**2.5 HANGERS, SUPPORTS**

- A. Installation of piping shall be such that damage cannot result through loading, expansion, or contraction of piping. Anchors shall be installed to obtain uniformity of pipe movement.
- B. Pipe supports shall be spaced sufficiently close to support pipes properly without formation of pockets. Supports and hangers shall be installed at ends of mains and branches and maximum intermediate spacing shall be as follows:

	MAXIMUM SPACING, (FT.)		MINIMUM ROD DIAMETER	
	Pipe Diameter, Inches		Pipe Dia.	Rod Dia.
	1" & Less	1-1/4" & More	Inches	Inches
Steel	8	10	2 & Less	3/8
Copper	6	8	2-1/2 to 3	1/2
Cast Iron	5 (One min. per length & fitting)		4 & Larger	5/8

- C. Pipe hangers shall be Superstrut, B-Line, or equivalent Grinnell. All hangers shall be electro-chromate finished. Hanger rods shall have electro-galvanized finish.
- D. Steel pipe, cast iron soil pipe: C-711 pipe hangers.
- E. Copper tubing: C-711 pipe hanger complete with C-716 isolator.
- F. Insulated pipe: C-711 pipe hanger fitted to outside of insulation with C-790 galvanized shields.
- G. Trapeze Hangers
  - 1. Grouped pipes may be supported by A-1200 channel bolted to rods.
  - 2. Copper and steel pipe shall be attached to channels with A-716 "Cush-A-Clamp."
- H. Cast iron soil pipe shall be supported with C-711 pipe hangers with rods attached to the bottom of channels.
- I. Point of Support Connectors
  - 1. Wood Construction

- a. 540 side beam hanger for stationary pipes.
- b. S-541 for pipes subject to movement.
- 2. Vertical Pipe Risers: Vertical pipes risers shall be securely supported with C-720 pipe clamps (C-720P for bare cold water pipe) anchored to construction.
- J. Provide resilient mounting for domestic water piping. Thermal insulation may serve as resilient mounting for insulated piping.
- K. Suspended water piping shall be anchored with steel struts installed at midpoint of each run.
- L. No valve or piece of equipment shall be used to support piping.

## **2.6 CLEANOUTS**

- A. Cleanouts in membrane damp-proofed floors shall have flashing flange and membrane clamps. Plugs shall be bronze, with cast iron body ferrule for cast iron pipe.
- B. Floor Cleanouts (FCO): Zurn ZN 1400-HD, "Level-trol" adjustable cleanouts, dura-coated cast iron with gas and water-tight ABS tapered thread plug, and round scoriated top, adjustable to finished floor .
- C. Grade Cleanouts (GCO): Zurn Z-1474-IN or equal JR Smith. Housing to be dura-coated cast iron body with integral anchor flange and scoriated cover with lifting device. Cleanouts in unpaved areas shall be set in 18" x 18" x 4" concrete pads.
- D. Wall Cleanouts (WCO):
  - 1. Copper tubing: Nibco Figure 816 or 817, with Zurn Z-1462, 6" x 6" polished chrome-plated bronze wall plate and frame.
  - 2. Cast iron pipe: Zurn Z-1441, dura-coated with gas and water-tight bronze, taper thread plug and round smooth stainless steel access cover with securing screw.
  - 3. Steel pipe: Zurn Z-1468, round stainless steel wall access cover, complete with securing screw and bronze raised hex head plug for steel pipe.
- E. Acid Resistant Floor Cleanouts (AFCO): ORION FCO corrosion resistant finished floor cleanout. Manufactured from fire retardant polypropylene material conforming to ASTM D4101, ferrule supplied with countersunk plug and adjustable top with square nickel bronze cover, with AWCO (Acid Waste Cleanout) cast in cover.
- F. Acid Resistant Wall Cleanouts (AWCO): ORION Blueline FRPP SF corrosion resistant Cleanout Tee. Manufactured from fire retardant polypropylene material conforming to ASTM D4101. Fitting layouts to conform to ASTM D3311 and ASTM F1412.

## **2.7 SLEEVES, WALL PLATES**

- A. Service pipe through exterior wall, roofs: Crane Style BC wall and ceiling plates; chrome plated at finished rooms.
- B. Pipes through, under footings: 18 gauge iron sleeves two diameters larger than pipe, cast in concrete, annular space filled with mastic or plastic bituminous cement.

- C. Pipes through fire rated walls shall be protected with fire retardant mastic as detailed on the Drawings. Installation shall be in full accordance with the requirements of the UL system number. Hilti or approved equal.
- D. Wall and ceiling plates: Crane Style BC or equal; chrome plated at finished rooms.
- E. Pipes through floors, interior concrete walls, and through fire rated wall and smoke stop partitions: 18 gauge iron sleeves, two diameters large than pipe, annular space filled with 3M Brand Fire Barrier CP-25 caulk.
- F. Pipes through 1-hour walls shall be protected with fire retardant mastic as detailed on the Drawings. Installation shall be in full accordance with the requirements of the UL system number. Hilti or approved equal.

## **2.8 ACCESS DOORS**

- A. Where construction is not inherently accessible, provide adequately sized and conveniently located access doors in ceiling, walls, and furring for servicing valves, equipment, and appurtenances etc.
- B. Access doors shall be Karp, Milcor, or equal, prime coated steel for all surfaces except ceramic tile, 12"x12" minimum size as required. Locks shall be flush, screwdriver operated.
  - 1. Style KDW for gypsum board surfaces.
  - 2. Style PL for plaster surfaces.
  - 3. Style 210 for acoustic tile surfaces.
  - 4. Style DSC 214-M satin finish stainless steel at ceramic tile surfaces.
  - 5. Style "Fire Rated" at rated ceilings and walls.

## **2.9 PIPE INSULATION**

- A. Insulate all hot water supply piping, all hot water return piping, all cold water supply piping in exterior walls or unconditioned spaces, and all primary roof drain piping in conditioned spaces with John Manville "Micro-Lok" 650, Fiberglass, Certainteed, or equal, rigid fiberglass one-piece pipe insulation with and all purpose jacket. Jackets shall be constructed of high density, white kraft bonded to aluminum foil with fiberglass yarn, with a pressure sensitive closure system.
- B. All insulation shall have composite (insulation, jacket, and adhesive used to adhere the jacket to the insulation) Fire and Smoke Hazard ratings as tested under procedure ASTM E-84, NFPA 255 or UL 723, not exceeding: Flame Spread – 25, Smoke Developed – 50.
- C. Inserts shall be installed at outside hangers. Inserts between the pipe and pipe hangers shall consist of rigid pipe insulation of thickness equal to the adjoining insulation. Inserts shall not be less than 10" long for pipe sizes through 2 ½" and not less than 12" long for pipes larger than 2 ½".
- D. Metal shields shall be applied between hangers or supports and the pipe insulation. Shields shall be formed to fit the insulation and shall extend up to the centerline of the pipe and the length specified for hanger inserts.
- E. Insulation thickness shall be as follows:

1. All cold water piping: 1"
2. All hot water piping 1" and smaller: 1"
3. All hot water piping 1 ¼" and larger: 1 ½"
4. All primary roof drain piping: 1"

## **2.10 PIPE LABELS**

- A. All new domestic cold water, hot water, and hot water recirculation piping shall be clearly labelled.
- B. Industrial safety solutions piping labels shall be rated for indoor and outdoor use and be attached with permanent adhesive.
- C. Labels shall show the direction of flow and indicate the process media. Pipe labeling color and text size shall conform to ANSI/ASME A13.1-2007. Process piping shall be labeled a minimum of twice per room in locations designated by the Engineer.

## **2.11 FIXTURES**

- A. The quantity and location of fixtures shall be taken from the Architectural and Plumbing Drawings. Provide adequate supports and all standard trim normally furnished for fixtures. All enamel shall be acid resisting. Traps, unless otherwise noted shall be 17 gauge brass tubing, chrome plated when exposed.
- B. Except as otherwise shown, provide ¼" steel backing plates, 36" wide by 12" high minimum size, secured to a minimum of three studs by welding, or with ¼" x 2 ½" lag screws for all wall hung fixtures for which no other means of support is specified.
- C. Stops and supplies: Provide stops for all fixtures. Unless otherwise specified, stops exposed at lavatories and similar fixtures shall be Chicago #1016-ABCP, chrome plated, loose key. Concealed stops shall be Chicago #1771.
- D. All fixtures shall meet or exceed the requirements of the California Administrative Code, Title 24, Part 5.

## **PART 3 – EXECUTION**

### **3.1 SURFACE CONDITIONS**

- A. This Contractor shall be held to have examined the site and compared it with the Contract Documents, and to adequately understand the conditions under which the work is to be performed. In the event of discrepancy, this Contractor shall notify the Architect and proceed as directed. This Contractor shall be held responsible for all existing conditions, whether or not accurately described, and no allowance shall subsequently be made on his behalf for any error, omission, or extra expense due to failure or neglect to make such examination and notification.
- B. Prior to commencing the work of this Section, this Contractor shall inspect the installed work of other trades and verify that their work is sufficiently complete to permit the start of work under this Section and that the completed work will be in complete accordance with the original design. In the event of discrepancy immediately notify the Architect and proceed as directed.

**3.2 ACCESSIBILITY**

- A. Equipment shall be placed and piping connections made in such a manner that all routine adjustments and maintenance operations may be carried out without inconvenience and so that all code requirements for clearances are maintained.

**3.3 VIBRATION AND SOUND CONTROL**

- A. Make all necessary provisions to prevent the transmission of vibration to the building structure, including flexible pipe connections to motor driven equipment, resilient mounting for piping, and sealing off pipe and duct penetrations of walls and roof.

**3.4 INSULATION**

- A. Insulation shall be applied in complete accordance with the manufacturer's published installation instructions. All insulation shall be applied on clean, dry surfaces and shall be continuous through wall and ceiling opening and sleeves. All joints shall be firmly butted together and longitudinal jacket laps and butt strips shall be smoothly secured. Specified adhesives, mastics, and coatings shall be applied at the manufacturer's recommended minimum coverage per gallon.

**3.5 PIPING INSTALLATION – GENERAL**

- A. Rough in shall proceed as rapidly as general construction will permit. All rough-in shall be complete, at locations verified by Architect and Owner, and tested and inspected prior to installation of concrete, lath, plaster, gypsum wallboard, or other finishes.
- B. All piping shall be concealed in finished rooms, installed in furred walls and partitions. Where furred or suspended ceilings occur, piping shall be installed in the concealed space at points adjacent to beams and/or other structural members, and coordinated with ductwork and equipment. Where exposed piping occurs, it shall be installed parallel to or at right angles to building walls, unless specifically shown otherwise on the Drawings.
- C. Installation of piping shall be such that damage cannot result, through thermal expansion or contraction, to piping, building, or pipe hangers and supports. Anchors shall be installed at midpoints of all runs in main piping for the purpose of localizing pipe expansion or prevention of creepage.
- D. All pipe lines shall be installed free from traps and air pockets, true to line and grade, with suitable supports properly space. All piping shall be installed without undue stresses and with provision for expansion and contraction.
- E. All piping shall be new and free from foreign substances. American standard pipe threads shall be used for IPS threaded work. Joints in threaded piping shall be made up with Teflon tape applied to the male threads only. No screwed pipe joints shall be caulked or packed with rope or other packing materials. Pipe shall be free from tool marks, threads cut accurately with not more than two (2) threads showing beyond fitting. Friction wrenches shall not be used with plated, polished, or soft metal piping. All changes in pipe size shall be made with reducing fitting. Bushings will not be permitted.
- F. Protect unattended openings in piping during construction.
- G. No water or drainage piping shall pass over electrical equipment unless adequate protection is provided to prevent damage by leaks or condensation.

- H. All copper tubing shall be formed in a workmanlike manner, in accordance with the Pipe and Tube Bending Handbook of the Copper and Brass Research Association. A tube bender giving support to the periphery of the tube shall be used. The tubing shall be protected against flattening or other injury.
- I. All copper connections and joints shall be made in accordance with the Copper Tube Handbook, Copper and Brass Research Association. No swaged connections will be permitted. All valves, pumps, and similar equipment shall be connected to copper piping through union or flange adapter fittings.
- J. Valves, cocks, etc., shall be installed to allow convenient accessibility and operation.
- K. Unions and flanges shall be installed to allow convenient replacement of all equipment and clearing tubes.
- L. A union connection shall be installed downstream from all valves, at equipment connections and at other locations as required or directed.
- M. Shut off valves shall be provided in all main services, and where required to permit proper servicing of equipment. Valves of one type shall be of one manufacturer.
- N. All valves shall be of the same size as the pipelines in which they are installed, unless specifically sized on the Drawings. All hand controlled line valves shall be ball valves, except where throttling control or frequent operation is required, in which case globe or angle valves shall be used. Globe valves in horizontal lines shall be installed with stem in horizontal to permit line draining. All globe and angle valves shall be installed to close against pressure. Disc valves shall have discs suitable for the services for which they are to be used.
- O. All valves shall be accessible and shall not be installed with the stems below the horizontal plane. Provide access panels at walls, ceilings, or floors.
- P. Provide prime coated escutcheon plates at all points where exposed piping penetrates finished wall ceilings or floors.
- Q. Cutting or boring of joists or other structural members shall be done only when alternative routing is impossible and only upon written approval of the Architect or Owner.

### **3.6 INSTALLATION, PIPING**

- A. Soil, Waste, Vent, Drain Piping
  1. Soil, waste, and vent piping occurring within the building shall be installed to a uniform minimum grade of  $\frac{1}{4}$ " per foot unless otherwise noted. Vent piping shall be graded so that all condensation shall flow directly to a soil or waste line.
  2. Changes in direction of drainage piping shall be accomplished by the use of appropriate drainage and sanitary fittings.
  3. Protection against breakage of piping passing under or through walls shall be provided using specified sleeves and caulking.
  4. Adapters shall be installed between threaded iron and soil pipe.
  5. Test tees shall be installed at the foot of all soil, waste, and storm water stacks.



6. Cleanouts shall be located where indicated on the Drawings; at all horizontal offsets; at ends of waste or sewer branches more the 5' in length; at intervals of 100' in straight runs of piping, or at closer intervals if directed or required by local code. Location of cleanouts in finished spaces shall be approved by the Architect prior to installation.
- B. Hot and Cold Water Systems
1. Di-electric unions shall be installed where copper pipe is connected to galvanized steel piping or stub outs.
  2. Connections from copper pipe to fixture supply fittings shall be made with copper or brass nipples.
  3. All domestic water piping shall be kept clear of the building structure. Where it is within 1" of the building structure, it shall be wrapped with felt (3/16" minimum thickness).
  4. To the greatest extent possible, domestic cold water piping shall be kept separated from hot piping and where there is a choice shall be run in the coolest portion of the available space.
- F. Plumbing Fixtures
1. Space between wall mounted fixtures and wall surface shall be neatly pointed up with silicone rubber compound of color matching fixture.
  2. All exposed bolt heads and nuts used to secure fixtures shall be concealed with vitreous china caps.

### **3.7 INSTALLATION, HANGERS & SUPPORTS**

- A. Installation of piping shall be such that damage cannot result through loading, expansion, or contraction of piping. Anchors shall be installed to obtain uniformity of pipe movement.
- B. Hanger rod sizes shall be no smaller than 3/8-inch for pipe and tube sizes ½ to 4 inches and ½ inch for sizes 5-8 inches.
- C. Pipe supports shall be spaced sufficiently close to support pipes properly without formation of pockets. Hangers shall be installed at ends of mains and branches. Maximum horizontal support spacing shall be as follows:
1. Steel Pipe for Water or DWV: 10 feet for pipe sizes ¾ inch and smaller and 12 feet for sizes 1 inch and larger.
  2. Steel and Tinned Copper Pipe for Gas: 6 feet for ½ inch pipe; 8 feet for sizes ¾ to 1 inch, and 10 feet for sizes 1 ¼ inch and larger.
  3. Copper Tube and Pipe, soldered or brazed: 6 feet for pipe sizes 1 ½ inches and smaller and 10 feet for sizes 2 inches and larger.
  4. Hubless Cast-Iron shall be supported at every other joint, unless over 4 feet, then support each joint. Support adjacent to joint, not to exceed 18 inches, brace at not more than 40 foot intervals to prevent horizontal movement. Support at each horizontal branch connection. Hangers shall not be placed on the coupling.
- D. Provide resilient mounting for domestic water piping. Thermal insulation may serve as resilient mounting for insulated piping.

- E. Suspended water piping shall be anchored with steel struts installed at midpoint of each run.
- F. No valve or piece of equipment shall be used to support piping.
- G. Pipes through studs or joists shall be isolated from structure with properly sized Hubbard "Hole-Rite" suspension clamps.

### **3.8 TESTING, INSPECTIONS**

#### **A. General**

- 1. This Contractor shall not allow or cause any work of this Section to be covered or enclosed until it has been inspected, tested, and approved by the Architect and the authorities having jurisdictions over the work. Should any of this work be enclosed or covered up before such inspection, testing, and approval, this Contractor shall uncover the work, have the necessary inspections, tests, and approvals made and, at no expense to the Owner, make all repairs necessary to restore both his work and that of other contractors that may have been damaged, to be in conformity with the Contract Documents.

#### **B. Tests**

- 1. This Contractor shall make all tests required by all local, state, and federal laws, codes, ordinances, and regulations having jurisdiction over this work.
- 2. Furnish all necessary labor, materials, and equipment for conducting tests, and pay all expenses in connection therewith. Should leaks develop while testing, repairs shall be made, and tests shall be repeated until a satisfactory test is obtained.
- 3. Water Piping shall be hydrostatically tested for 6 hours at 150 psi. All equipment shall be tested water tight at utility pressure.
- 4. Drainage and Vent Piping shall be tested for 1 hour by plugging all outlets and filling the pipes with water to the top of vertical sections of pipes. No loss of water shall be permitted.
- 5. For pressures above 14 inches water column, contractor shall test all new gas piping with air at a minimum pressure of 60 psi for a duration of four hours with no discernible reduction in pressure. Shutoff valves may not be used for isolation of piping during testing, unless the valve and valve-closing mechanism are rated for the test pressure.
- 6. For pressures below 14 inches water column, contractor shall test all new gas piping with air at a minimum pressure of 15 psi for a duration of four hours with no discernible reduction in pressure. Shutoff valves may not be used for isolation of piping during testing, unless the valve and valve-closing mechanism are rated for the test pressure.
- 7. Upon completion of the installation, the gas utility provider shall test entire piping system, including both new and existing piping, to ensure that the system is safe to be placed in service. Contractor shall be responsible for being familiar with gas utility provider testing requirements and assisting with gas utility provider test procedures. Any leaks or deficiencies shall be repaired at no additional cost to the owner.

### **3.9 DOMESTIC WATER SYSTEM STERILIZATION**

- A. Upon completion of this work, the domestic water system shall be thoroughly flushed, sterilized, and refushed. Sterilization and refushing shall be performed using the following procedure.
1. All work shall be performed in the presence of the inspector.
  2. Introduce chlorine or a solution of sodium hypochlorite, filling the lines slowly and supplying the sterilization agent at a rate of 50 parts of chlorine per million, as determined by residual chlorine tests at the ends of all branches. Open and close all valves while the system is being chlorinated to insure uniform distribution.
  3. After the sterilizing agent has been applied for 24 hours, test for residual chlorine at the ends of the branches. If less than 5 ppm is indicated, repeat the sterilization procedure.
  4. When tests show at least 5 ppm of residual chlorine, flush out the system until all traces of the chemical are removed.
- B. After a period of 48 hours minimum, bacteriological tests, using samples from at least 3 representative points shall be made by recognized testing agency, who shall certify to the Architect that the system is bacteriologically safe and at least equal in safety to that of the principal water supply. The laboratory report and certification shall be transmitted to the Architect and Owner.

### **3.10 ADJUSTING**

- A. Properly adjust all stops, and controls, and demonstrate safe and satisfactory operation of all equipment.

### **3.11 CLEANING**

- A. Flush all water piping systems. Remove, clean, and replace all strainer baskets prior to final inspection.
- B. Blow out all compressible fluid piping with compressed air before connecting with regulators or equipment.

### **3.12 CLEANUP**

- A. Upon completion of the work of this Section, remove all surplus material, debris, and equipment associated with or used in the performance of this work.

**END OF SECTION**

## **PART 1 – GENERAL**

### **1.1 INCLUDED**

- A. This section covers mechanical work, complete. Work includes furnishing, installing, calibrating, adjusting, testing, documenting, and starting up equipment in accordance with these Specifications, the accompanying Plans, and the directions of the Engineer.

### **1.2 LICENSES, PERMITS, AND FEES**

- A. The Contractor shall provide, procure, and pay for all licenses, permits, fees, etc. as required to carry on and complete their work.

### **1.3 CODES AND STANDARDS**

- A. All work shall be done in code with all applicable local, state, and federal building safety codes, ordinances, and regulations. Additionally, all work shall conform to the latest editions of the following standards:
  - 1. National Fire Protection Association.
  - 2. California Mechanical Code.
  - 3. California Plumbing Code.
  - 4. Underwriters Laboratories.
  - 5. Titles 8, 17, 19, 21, 24 of the California Code of Regulations.
  - 6. California Electric Code.
  - 7. SMACNA Standards.
  - 8. ASHRAE Standards 55 and 62.1.
- B. When the Contract Documents call for materials or construction of a higher standard than is required by the above, the Contract Document requirements shall take precedence over the requirements of the applicable laws, ordinances, rules, or regulations. Nothing in the Contract Documents shall be interpreted as permitting work in violation of said laws, rules, and/or regulations.
- C. The Contractor for this work shall furnish, without extra charge, any additional materials and/or labor as may be required for compliance with these laws, rules, and/or regulations though such materials and/or labor are not specially set forth in the Contract Documents.

### **1.4 LICENSING REQUIREMENTS**

- A. All work of Division 22 and 23 shall be performed by an appropriately licensed contractor. The licenses shall be current, valid through the term of the contract and in the name of the contractor.
  - 1. All HVAC work, which includes warm air heating systems, ventilating systems, air conditioning systems, and ductwork, registers, flues, humidity, and thermostatic controls

in connection with these systems, shall be performed by a C-20 – Warm-Air Heating, Ventilating and Air-Conditioning Contractor.

### **1.5 SUBMITTALS**

#### **A. General Requirements**

1. Submittal lists and drawings shall include identifying marks assigned by the Drawings and Specifications.
2. Review of drawings and other material submitted shall not be construed as complete check or constitute a waiver of the requirements of the Drawings and Specifications, but will indicate that the material submitted is acceptable in quality and utility. This review shall not relieve the Contractor of the responsibility to fit the proposed materials to the spaces provided, and to effect necessary rearrangements or construction of other work.
3. All fixtures, materials, and equipment equal in quality and utility to these herein mentioned will be accepted. When specific names are used in describing fixtures, materials, and equipment they are mentioned as standards only, but this implies no right on the part of the Contractor to use other fixtures, material, and equipment or methods, unless approved as equal in quality and utility by the Architect.
4. Before any fixtures, materials, or equipment are purchased, the Contractor shall submit to the Architect for approval, a complete list of materials, fixtures, and equipment, giving the manufacturer's names, catalog number, capacity, size, power requirements, etc.
5. The Contractor shall submit for the approval of the Architect, shop drawings of proposed material and equipment that differ from the specified materials and equipment, and of any specified materials and equipment with special conditions and/or arrangements. These drawings shall show necessary modifications of owner, plumbing, electrical, and mechanical work required by the proposed materials and equipment.

#### **B. Submittal – Product Data**

1. Submit manufacturer's product data for all HVAC equipment, in compliance with specifications.

### **1.6 COOPERATION WITH OTHER TRADES**

- A. Cooperate fully with other trades doing work on the project as may be necessary for the proper completion of the project. Refer to the Structural, Plumbing, and Electrical Drawings for details of the building structure and equipment installation that will tend to overlap, conflict with or require coordination with the work of this Section, and schedule this work accordingly.
- B. Any work done without regard for other trades shall be moved, replaced, or redone as required, without extra charges to Owner.

### **1.7 DIVISION OF WORK BETWEEN DIVISIONS 23 AND 26**

- A. Close coordination between the electrical and mechanical trades is a part of the work that is required by this contract. No allowance will be made for omissions based on incorrectly assuming another trade will be performing your work. Confirm your scope of work with the general contractor.

- B. The division of responsibilities between trades supplying equipment in other Divisions may be different. For instance, Division 26 contractor may be required to supply disconnect switches and starters for non-HVAC mechanical equipment supplied under other Divisions.
- C. Division 23 Responsibilities
  - 1. Assume responsibility for the proper functioning of the HVAC systems in their entirety.
  - 2. Furnish and install all conductors and conduit required for control of HVAC equipment.
  - 3. Make all terminations with the exception of power conductors.
  - 4. Furnish and install all control panels and devices to provide a complete and functional controls system, including all controls transformers.
  - 5. Furnish and install motor starters for all equipment specified in Division 23.
  - 6. Install duct smoke detectors furnished by fire alarm contractor in buildings with fire alarm systems.
  - 7. Furnish and install duct smoke detectors in buildings without fire alarm systems.
  - 8. Furnish and install all control conductors and conduit connecting duct smoke detectors to smoke dampers and fan start controls.
  - 9. All electrical work performed under Division 23 shall conform to the requirements of Division 26.
- D. Division 26 Responsibilities
  - 1. Furnish and install all raceways, conduit, disconnect switches, and conductors necessary for electrical power supply.
  - 2. Make all power supply terminations to motors, starters, disconnect switches, control transformers, and other mechanical devices.
  - 3. Fire alarm contractor to furnish duct smoke detectors in buildings with fire alarm systems.
  - 4. Provide power to all duct smoke detectors and smoke dampers.
  - 5. Coordinate all work with mechanical contractors.

### **1.8 AS-BUILT DRAWINGS**

- A. A complete set of Contract Drawings shall be maintained at the work site, and all changes in the work shall be recorded on this set, on a daily basis. The final as-built drawings shall be submitted to the Architect for approval.

### **1.9 DESIGN DRAWINGS**

- A. The drawings indicate diagrammatically the general layout of the mechanical systems and other related work. Field verification of scaled dimensions taken from the Drawings is required.
- B. The Contractor shall review and compare the Architectural, Structural, Plumbing, Mechanical, and Electrical Drawings and all Owner supplied equipment Drawings, and adjust their work to

be in conformity with the conditions indicated thereon. Discrepancies between drawings, between drawings and actual field conditions, or between Drawings and Specifications, shall promptly be brought to the attention of the Architect for a determination of the modifications to be effected. In the event that a major modification is required, a Change Order will be prepared.

#### **1.10 VERIFICATION OF EXISTING CONDITIONS AND DEMOLITION**

- A. Before installation of any new work, verify the location, size, and other conditions at all points of connection to services or other existing piping, and at all locations where new work will cross or pass near existing piping, electrical, or other facilities.
- B. Remove ductwork, piping, controls, fixtures, and equipment that is not to remain in service as shown on the Drawings or as required. This included the removal of associated appurtenances and supports.
- C. Patch, cap, or repair existing works affected by this demolition in concealed spaces within six (6) inches of a live main or branch.
- D. Deliver removed material to the Owner as directed by the Architect. Dispose of all other removed material offsite.
- E. Information shown relative to existing services is based upon available records and data during preparation of the Drawings, but shall be verified. Make reasonable deviations found necessary to conform to actual locations and conditions, without extra charge.

#### **1.11 OPERATING AND MAINTENANCE INSTRUCTIONS**

- A. Furnish three sets of typewritten instructions covering maintenance, adjustment, and operation of each piece of apparatus, bound in a hard cover loose-leaf binder. Neatly obscure or cross out inapplicable data from manufacturer's literature. Submit data to the Architect.
- B. Operating instructions shall show sequence of operations, lubrication, care, and maintenance requirements of all equipment. Final acceptance of the work will not be made until a satisfactory submission of this material is received and approved by the Architect.
- C. The Owner's authorized representative shall be instructed in the operation and servicing of all HVAC & plumbing systems.

#### **1.12 ACCURACY OF DATA**

- A. The data given herein and on the Drawings are as exact as could be reasonably secured, but absolute accuracy is not guaranteed. Exact locations, distances, elevations, etc. will be governed by shop drawings, the building itself, and actual field conditions.

#### **1.13 DAMAGE BY LEAKS**

- A. Contractor shall be responsible for any damage to work of other Contractors that is caused by leaks in any temporary or permanent piping systems due to pipe rupture, disconnected pipes or fittings, or by overflow of equipment.

#### **1.14 SEISMIC FORCE RESISTANCE: MECHANICAL, PLUMBING, FIRE PROTECTION SYSTEMS**

- A. All mechanical systems and plumbing piping systems shall adhere to the SMACNA "Seismic Restraint Manual: Guidelines for Mechanical Systems," Third Edition dated March 2008.

**1.15 DELIVERY, STORAGE, AND HANDLING**

- A. Contractor shall be responsible for delivery, storage, protection, and placing of all equipment and materials.
  - 1. Contractor shall protect the work and materials from damage during construction. Equipment stored at the job site shall be protected from dust, water, or other damage, and be covered if equipment is exposed to weather. Protect interiors of new equipment and piping systems against entry of foreign matter. Clean both inside and outside before painting or placing equipment in operation.
  - 2. Any items damaged shall be repaired or replaced, at no additional cost to the Owner.
- B. Cleanliness of Piping and Equipment Systems
  - 1. Exercise care in storage and handling of equipment and piping material to be incorporated in the work. Remove debris arising from cutting, threading, and welding of piping.
  - 2. Piping systems shall be flushed, blown, or pigged as necessary to deliver clean systems.
  - 3. Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

**1.16 WARRANTIES**

- A. Equipment warranties shall be provided for all equipment, with all necessary information filled in, except purchase date, in favor of the Owner.
- B. The contractor shall guarantee that all work under this Section is free from defects in material and workmanship for a period of one year from the date of filing the Notice of Completion. Replacement of defective work and damage caused to work of other trades as a result of such defective work shall be the responsibility of the Contractor, and shall be made at no cost to the Owner.

**1.17 ALTERNATIVE MATERIALS AND METHODS**

- A. These plans and specifications describe the general scope of the mechanical systems. These plans and specifications do not preclude the submittal of alternative methods or materials. Manufacturer's names and catalog numbers are stated to identify the type and quality of the equipment or materials required for the project.
- B. The contractor may submit shop drawings and/or technical information on alternative equipment, materials or installation details to accomplish the intent of the plans and specifications. Approval of the alternative equipment, materials or installation details shall not relieve the contractor of any responsibility for complying with the intent of the plans and specifications. Submit the manufacturers' technical information, shop drawings, and/or written description of alternative methods for each item described by manufacturer's name and catalog number and for each component, equipment, material, or installation detail required.

**1.18 SITE EXAMINATION**

- A. Thoroughly examine the site and verify the actual work conditions. No extra compensation will be allowed for expenses due to failure to discover site conditions which affect the work.



## PART 2 – PRODUCTS

### 2.1 GENERAL

- A. All materials, appliances, and equipment shall be new and best of their respective kinds, free from defects, and of the make, brand, or quality specified or as accepted by the Architect.
- B. When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
- C. Apply and install all items in accordance with manufacturer's written instructions. Refer conflicts between manufacturer's instructions and the contract drawings and specifications to the Architect for resolution.

### 2.2 DUCTWORK

- A. Sheet Metal Ductwork - Rectangular
  - 1. Ducts and plenums shall be fabricated and installed in conformance with the latest editions of: NFPA Pamphlet No. 90A; California Building Code; California Mechanical Code and the SMACNA HVAC Duct Construction Standards (Metal and Flexible). Ducts and plenums shall be constructed of hot dipped galvanized mild steel and shall have airtight Class "B" seals at all transverse joints and longitudinal seams. Tables and figures hereinafter referenced are from the 2005 edition of the SMACNA HVAC Duct Construction Standards (Metal and Flexible).
  - 2. Rectangular duct construction shall conform to Table 2-3. All transverse joints shall be flanged per Table 2-32, with corner closures or "Duct Mate" flanged connections with corner closures per Figure 2-17. Elbows shall be standard radius (Type RE 1) or square throat with vanes (Type RE 2) per Figure 4-2, with double thickness turning vanes per Figures 4-3 and 4-4. Offsets and transitions shall be per Figure 4-7. Supply, return, and exhaust branch connections shall be per Figure 4-5 or 4-6. Splitters shall not be used.
  - 3. Lined ducts shall be fabricated such that the net inside dimensions equals the duct sizes shown on the Drawings.
- B. Sheet Metal Ductwork - Spiral
  - 1. Round ducts shall be spiral, United McGill or equal. All transverse joints and longitudinal seams shall have Class "B" seals. All branches in round duct systems shall be made with factory fabricated reducing wye branches. Duct turns shall be made with standard, factory fabricated, three-piece elbows.
- C. Flexible Ductwork
  - 1. Flexible ducts shall be Flexmaster "8M" or approved equal. Flexible ducts shall be used only where shown on the Drawings, and maximum length of any given flexible duct shall not exceed 5 ft. Galvanized sheet metal elbows shall be used for turns greater than 45° on flexible ducts 10" and larger. Connections to rectangular ducts shall be made with "spin-in" fittings with air scoops. The installation of flexible ducts shall conform to Figure 3-10, with the exceptions noted herein.
- D. Supports
  - 1. Supports for horizontal ducts and plenums shall be fabricated per Figures 5-5 and 5-6 and Tables 5-1, 5-2, and 5-3. The maximum distance between hangers shall be eight

feet for rectangular ducts and twelve feet for round ducts. Attachments to the structure shall be made with adequately sized lag bolts for straphangers and adequately sized machine bolts and side beam brackets for rod hangers. Supports for vertical ducts shall be band iron strap or angle bracket type per Figure 5-8 and 5-9.

E. Specialties:

1. Duct Access Doors: Including those for removing filters, duct access doors shall be as detailed in Figure 7-2 with sash locks, piano hinges, and gaskets. Access doors shall have an unobstructed full swing.

## 2.3 DUCTWORK ACCESSORIES

A. Flexible Duct Connections

1. Duro-Dyne "Metal-Fab" with Duroion, Ventfabrics "Ventglass," or approved equal.
2. Install at each point where a blower unit is connected to a duct. A minimum clearance of three inches between the duct and the source of vibration shall be maintained. Install per Figure 2-17.

B. Screens

1. Install removable bird screens at all outside intakes and exhaust air discharges. Screens shall be fabricated from ½" x 14 gauge mesh secured in full frames. Screens and frames shall be constructed of the same material as the duct, hood, or equipment to which attached.

C. Joints

1. Tape all joints airtight using Hardcast type "DT" pressureless tape and "HD-20" adhesive, per manufacturer's directions.

D. Dampers

1. Provide butterfly or multi-blade dampers where indicated on the Drawings or as required for balancing air quantities to values shown without generating excessive noise. Provide Duro-Dyne "KS-385," or approved equal, locking quadrants on each manual damper. Locate dampers in furred ceilings near access panels where possible.
  - a. Butterfly dampers shall be constructed as per Figure 7-4, Figure A, B, and C in the duct manual.
  - b. Multi-blade dampers shall conform to Figure 7-5.
  - c. Back-draft dampers shall be Air Balance "Air Dynamic" model DY-1002-V, or equal.

## 2.4 INSULATION

A. Exterior of Ductwork:

1. Unless specified to be lined, all sheet metal supply and return ducts in indirectly conditioned spaces shall be insulated on the outside with Johns Manville "Microlite XG" flexible fiberglass blanket-type duct wrap, with factory applied FSK aluminum foil facing, with a composite UL rating of 25/50, minimum R-6 installed.

2. Unless specified to be lined, all sheet metal supply and return ducts in unconditioned spaces shall be insulated on the outside with Johns Manville "Microlite XG" flexible fiberglass blanket-type duct wrap, with factory applied FSK aluminum foil facing, with a composite UL rating of 25/50, minimum R-8 installed.
- B. Interior of Ductwork:
1. Duct lining shall be installed in supply and return ducts and plenums where noted on the Drawings. Lining shall be Johns Manville "PermacoteLinacoustic R" rigid fiberglass board for plenums and "PermacoteLinacoustic HP" fiberglass duct liner for ducts, 1" thick, unless otherwise noted, with fire resistant coating. Duct liner shall meet ASTM C 1071, with air surface coated with acrylic coating treated with EPA registered anti-microbial agent prove to resist microbial growth as determined by ASTM G 21 and G 22. Insulation with torn or broken coating shall be removed and replaced. Loose corners, edges, and butt joints will not be accepted.
  2. All exposed exterior supply and return ductwork shall have minimum 2" interior insulation, as specified in this section.
  3. Maximum velocity: 5,000 ft/min.
  4. Fasteners: duct liner galvanized steel pins, welded or mechanically fastened.
  5. Developed smoke density shall not exceed 50. Flame spread rating shall not exceed 25.

## **2.5 REFRIGERATION PIPING AND APPURTENANCES**

- A. Refrigerant piping shall be Type "ACR" de-oxidized hard temper copper tube, ASTM B280.
- B. Mechanical joints on refrigerant piping systems are prohibited. All refrigerant piping joints shall be brazed. Use lead-free, silver solder, minimum 15% silver content.
- C. Pipe fittings shall be wrought-copper with soldered joints, ASME B16.22.
- D. Flexible connections shall be bronze, double braided, sweat solder ends.
- E. Moisture/liquid indicators (sight glasses) shall be color change moisture indication type, replaceable element, filter screen and pad, sweat solder ends; Sporlan "See-All", Henry, or equal.
- F. Charging and purge valves shall be forged brass, diaphragm packless, globe type, angle or straight through, one end solder, one end flare; Henry 623 and 643 series, Sporlan or equal.
- G. Solenoid valves shall be forged brass, extended end connections, solder ends, molded coil; Sporlan "E" series or equal. Comply with ARI 760 & UL 429.
- H. Filter driers shall be replaceable media, angle type; Henry "Dri-Cor" or equal; ARI 730.
- I. Thermostatic expansion valves shall have forged brass body, stainless steel seats and pins, ODF solder connections, external equalizer;; ARI 750.
- J. Outdoor condensing units shall have a flexible piping section at the outdoor unit.

- K. Refrigerant piping between the outdoor unit and the individual fan coil (split system) or branch selector box (VRF system) shall be Type "ACR" de-oxidized hard temper copper tube, ASTM B280.
- L. Refrigerant piping (exposed) between the indoor branch selector boxes and the individual fan coil in exposed areas shall be Type "ACR" de-oxidized hard temper copper tube, ASTM B280.
- M. Refrigerant Piping shall be insulated with 1" wall thickness "Armacell AP Armaflex" black flexible closed-cell elastomeric thermal insulation in tubular form with self-seal system reinforced with lap seal tape.
- N. Refrigerant piping (concealed) between the indoor branch selector boxes and the individual air handling units may be pre-insulated line sets, IsoClima or equal. Pre-insulated with expanded polyethylene sheath, closed cell with external LDPE foil. Piping shall be crimped closed for safety. Tested in accordance with UL94 for Surface Burning Characteristics, UL723A for Flame/Smoke Index and UL746A for Ignition Resistance. Copper shall be ASTM B280 approved.

## 2.6 REGISTERS, GRILLES, AND DIFFUSERS

- A. Air terminals shall be Titus, equivalent Nailor, or approved equal, as scheduled on the Drawings.
- B. All terminals shall be steel and shall be factory painted "off-white," unless otherwise noted. Air terminals for installation in gypsum board shall have a 1" border for surface mounting.

## 2.7 ACCESS PANELS

- A. Where construction is not inherently accessible, provide adequately sized and conveniently located access doors in ceilings, walls, and furring for servicing valves, equipment, etc. Doors shall be delivered to the General Contractor for installation.
- B. Fire Rated: Inryco/Milcor, U.L. listed, "B" label, 1 ½ hour rating. Minimum size shall be 12" x 12". Provide larger sizes where required. Locks shall be flush screwdriver operated.
- C. Drywalled Surfaces: Inryco/Milcor, Style DW, prime coated steel. Minimum size shall be 12" x 12". Provide larger sizes where required. Locks shall be flush screwdriver operated.
- D. Concrete and Tiled Surfaces: Inryco/Milcor, Style M, prime coated steel, except access panels installed in tiled surfaces shall be stain finish stainless steel. Minimum size shall be 12" x 12". Provide larger sizes where required. Locks shall be flush screwdriver operated.
- E. Plastered Surfaces: Inryco/Milcor, Style K, prime coated steel. Minimum size shall be 12" x 12". Provide larger sizes where required. Locks shall be flush screwdriver operated.

## PART 3 – EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Provide all necessary cutting in connection with the work of the Section. No cutting shall be done without the approval of the Architect. Comply with requirements specified in Cutting and Patching Section.

- B. No structural members shall be drilled, bored, or notched in a manner that will impair their structural capacity.
- C. All penetrations of concrete or masonry shall be made with core drills.

### **3.2 EQUIPMENT STARTUP**

- A. Notify the Owner's representative a minimum of two weeks prior to equipment startup date to allow for Owner's personnel to be present during startup.
- B. Manufacturer must provide a service technician to supervise rigging of the units to ensure proper fit.
- C. Unit must be checked out, tested and placed into operation by the installing contractor under the supervision of an authorized representative of the factory.
- D. Controls contractor must be present during startup to ensure that factory-installed controls have been adequately installed, wired, and integrated into the building managements system.
- E. Provide minimum eight (8) hours of training time with Owner's maintenance personnel to thoroughly review new equipment, maintenance requirements, and equipment controls.
- F. During startup, the full functionality of the equipment shall be demonstrated to the satisfaction of the Owner's representative, including heating, mechanical cooling, economizer cooling, zone modulation, and all emergency shutdown features.

### **3.3 EQUIPMENT, GENERAL REQUIREMENTS**

- A. Equipment shall operate quietly and without objectionable vibration. Such problems, other than from equipment operating at optimum conditions, shall be the Contractor's responsibility and shall be eliminated at the direction of the Architect.
- B. Install equipment to provide good appearance, easy access, and adequate space to allow replacement and maintenance. Provide bases, supports, anchor bolts, and other items required to achieve this. Installation shall be level, above moisture level, and adequately braced.
- C. Thoroughly lubricate equipment before operating. Repair of damage resulting from failure to comply with this requirement shall be the Contractor's responsibility.
- D. Connections to piping shall be secured and properly aligned and all utility and control connections shall be properly isolated from the building structure by means of vibration isolators and flexible connections. Any equipment not meeting this requirement will be modified and reinstalled at no expense to the Owner.
- E. Move equipment into building through available openings. Dismantle equipment where necessary to accomplish this. After reassembly, test equipment to verify its satisfactory operating condition.

### **3.4 DUCTWORK**

- A. All ductwork shall be installed within spaces provided where possible. Ducts shall be installed true to line and grade, fully secured to structural faming with specified hangers and supports, insulated, and vibration isolated, where required.

- B. Each section of supply air ductwork shall be cleaned at the shop, dust and oil free, using a degreasing agent and detergent and sealed airtight at both ends with visqueen and tape. Supply ducts shall be additionally cleaned with a disinfecting solution. Ends of all supply and internally insulated exhaust ducts shall be kept sealed until the time they are jointed. When duct sections are jointed, wipe down all interior surfaces with a clean tack cloth. If tack cloth shows any dust, then re-clean duct as described above. The intent is that no foreign matter be allowed to enter the ductwork at any time after factory cleaning and during construction.

### **3.5 CONTROLS**

- A. This Contractor shall provide all required control components, including but not limited to thermostats, temperature sensors, static pressure sensors, humidity sensors, damper actuators, valve actuators, unitary controllers, relays, and low-voltage wiring, such that the Owner is provided with a fully functional control system.
- B. Where work is performed in an existing building, this Contractor shall integrate all control modifications into the existing building control system, if applicable. Specific requirements shall be coordinated with Owner and approved by Architect prior to installation.
- C. Installation of the system shall be made under the supervision of the manufacturer of the equipment, or his factory authorized representative.
- D. In addition to the submittals required above, and those set forth in "Submittals," the following items shall be furnished.
  - 1. In an existing building, this Contractor shall furnish a document that describes the proposed materials methods for integration into the existing building management system, if applicable.
  - 2. Prior to final inspection, the system contractor shall furnish a letter stating that the entire control system and all interlock wiring is installed and operating in a satisfactory manner.

### **3.6 THERMOSTAT**

- A. Room thermostats shall be installed in the locations indicated on the Contract Drawings. Final locations shall be coordinated with Owner's maintenance personnel and shall be installed in locations which shall provide representative temperatures for the adjacent areas.
- B. Existing pneumatic thermostats shall be relocated from existing walls to new walls as required by demolition and new work.
- C. Low voltage control wiring and conduit shall be installed in accordance with requirements of Division 26.

### **3.7 INSULATION**

- A. Exterior Ductwork:
  - 1. The insulation shall be cut longer than the perimeter of the duct to provide 2" staple lap and minimum compression at the corners. All joints shall be lapped 2' and stapled with outward clinching staples 2" on center. The insulation shall be mechanically fastened to the underside of all ducts 24" wide or more using cup-head pins, weld pins, or stick pins with speed clips 18" on center. All joints and penetrations of the vapor barrier jacket shall be sealed with a minimum 3" wide matching pressure sensitive tape. Pressure-sensitive tape shall be firmly rubbed in place immediately after application using a "squeegee" type tool.

2. When a vapor seal is required, two coats of vapor retarder mastic reinforced with one layer of 4" wide, open weave glass fabric may be used in lieu of pressure-sensitive tape. Mastic shall be brushed onto joint and glass fabric until the fabric is filled. Mastics shall be applied in accordance with application instructions on the container.

**B. Interior Duct Liner**

1. Apply to the inside face of ducts, coated side facing air stream, fasten using fire retardant adhesive meeting ASTM C 9169, and secure with mechanical liner fasteners at 24" maximum o.c., both directions. Pin length should be such as to limit compression of liner.
2. Exposed edges must be factory or field coated. For systems operating at 4000 fpm or higher, a metal nosing must be installed on all liner leading edges. Insulation with torn or broken coatings shall be removed or replaced. Loose corners, edges, and butt joints will not be accepted.

**3.8 SUPPORTS AND HANGERS**

- A. All hangers, supports, and attachments to the structure must be capable of withstanding three times the anticipated load.

**3.9 TEST, INSPECTIONS**

- A. Make all necessary control adjustments and balancing of air flows. Operate the entire system for a period of time not less than three (3) working days for the purpose of proving satisfactory performance. During this period, instruct such persons as the Owner and/or Architect may designate in the proper operation of the systems. Should further adjustment prove necessary, operating tests shall be repeated until a satisfactory test is obtained.
- B. This Contractor shall not allow or cause any work of this Section to be covered or enclosed until it has been inspected, tested, and approved by the Architect and the authorities having jurisdiction over the work. Should any of this work be enclosed or covered up before such inspection, testing, and approval, this Contractor shall uncover the work, have the necessary inspections, tests, and approvals made and, at no expense to the Owner, make all repairs necessary to restore both his work and that of other contractors which may have been damaged to be in conformity with the Contract Documents.

**3.10 CLEANUP**

- A. Upon completion of the work of this Section, remove all material, debris, and equipment associated with or used in the performance of this work.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SCOPE**

- A. Provide all supervision, personnel, instruments, calibration, equipment, and all other materials necessary to perform balancing and testing, and compile test data including calculations and services necessary for the heating, ventilating, and air conditioning systems for this project, all in accordance with the project Drawings and Specifications and as specified herein.

**1.2 GENERAL**

- A. Mechanical Contractor will employ a Testing, Adjusting, and Balancing (TAB) Agency that is certified by Associated Air Balancing Council (AABC), National Environmental Balancing Bureau (NEBB), or Testing, Adjusting, and Balancing Bureau (TABB).
- B. The TAB Agency shall be responsible for inspecting, balancing, adjusting, testing, and logging the data of the performance of fans, all dampers in the duct systems, all air distribution devices, and the flows of water through all coils.
- C. Existing equipment, unless specifically mentioned otherwise, shall not in the scope of the TAB work.
- D. A completely operable system shall be placed into operation each day during testing and balancing.
- E. The TAB Agency shall utilize instrumentation which meets the requirements of ASHRAE 111, Section 5, "Instrumentation".
- F. The Mechanical Contractor shall be responsible for certifying in writing that the system, as scheduled for balancing, is operational and complete. Completeness shall include not only the physical installation, but the Mechanical Contractor's certification that the prime movers are installed in good working order, and that full load performance has been preliminary tested under the certification of the Mechanical Contractor. Before any testing and balancing is started, a complete report shall be sent to the TAB Agency by the Mechanical Contractor.
- G. The Mechanical Contractor shall be responsible for making all modifications to recertify discrepancies reported by the TAB Contractor as indicating non-compliance with the Contract Documents. By completing the work on time, the Mechanical Contractor shall provide sufficient time before the completion date so that balancing can be accomplished.
- H. If construction deficiencies are encountered which preclude obtaining optimum conditions, the deficiencies will be recorded and given to the Owner's representative. The TAB Agency is advised that deficiencies in the HVAC construction are often encountered during final TAB services, and should include in the bid an amount deemed advisable to compensate for time in identifying the deficiencies.

**1.3 SERVICES**

- A. The TAB Agency will balance, test, and adjust the systemic components to obtain optimum conditions in each conditioned space in the building. If construction deficiencies are encountered which preclude obtaining optimum conditions, the deficiencies will be recorded and given to the Owner's representative. The TAB Agency is advised that deficiencies in the



HVAC construction are often encountered during final TAB services, and should include in the bid an amount deemed advisable to compensate for time in identifying the deficiencies.

- B. The report shall be complete with logs, data, and records as required herein and all logs, data, and records shall be typed, produced, on white bond paper, and bound. Transmit four copies directly to the Owner's Representative to be distributed to the Mechanical Contractor, Controls Contractor, Engineer, and record file.
- C. The report shall contain the following general data in a format selected by the TAB Agency for clarity and ease of reference.
  - 1. Project Title.
  - 2. Project Location.
  - 3. Project Architect (Firm name and address).
  - 4. Project Mechanical Engineer (Name).
  - 5. TAB Field Test Engineer (Name).
  - 6. TAB Agency (Firm name and address).
  - 7. Inclusive dates tests were performed and date of report.
  - 8. Calibration Certificates of each instrument used along with specific ID numbers (i.e., serial numbers).

#### **1.4 SUBMITTALS**

- A. TAB Agenda
  - 1. The TAB Contractor shall submit a complete agenda, which shall outline in full the testing methods and locations for each HVAC system and/or device that is within the scope of the TAB work. The agenda shall represent the total system balance report, less field test data. Areas of intended field test inputs shall be represented by fully labeled blank spaces.
  - 2. The TAB Agenda shall also indicate the proposed test methods, instrumentation devices and all applicable calibration certificates.
- B. TAB Report
  - 1. Provide Test and Balance Report as indicated herein.

#### **1.5 AIR SYSTEMS REQUIREMENTS**

- A. In addition to the above data in its appropriate format, the Test and Balance Report shall include the following data:
  - 1. Existing Air Handling Units
    - a. Manufacturer and model.
    - b. Size.

- c. Motor hp, voltage, phase, cycles, full load amps.
  - d. Location and local identification data.
  - e. Identification tag listed in schedules on drawings and specifications.
  - f. Supply airflow (cfm) and exhaust airflow (cfm), where applicable.
  - g. Fan RPM.
  - h. Motor current readings at each fan.
  - i. Inlet and outlet static pressure from supply fan and exhaust fan (if applicable). These readings shall be related to the fan curve.
  - j. Static pressure differential across each coil and filter section.
  - k. Entering air and leaving air temperatures (DB/WB) in 100% cooling mode.
  - l. Entering air and leaving air temperatures (DB) in 100% heating mode.
  - m. Outdoor air percentage setting.
  - n. Outdoor airflow in economizer mode (if applicable).
  - o. Outdoor airflow in demand control ventilation mode (if applicable).
2. Exhaust Fans
- a. Manufacturer and model.
  - b. Size.
  - c. Motor hp, voltage, phase, cycles, full load amps.
  - d. Location and local identification data.
  - e. Identification tag listed in schedules on drawings and specifications.
  - f. Exhaust airflow (cfm).
  - g. Fan RPM.
  - h. Motor current readings at each fan.

**PART 2 – PRODUCTS (not used)**

**PART 3 – EXECUTION**

**3.1 GENERAL PROCEDURES**

- A. During the balancing, the temperature regulation shall be adjusted for proper relationship between controlling instruments and calibrated. The correctness of the final setting shall be proved by taking hourly readings for a period of one successive 8-hour day, in a typical room on each separately controlled zone, after tenant moves in. The total variation shall not exceed 2 degrees from the preset medium temperature during the temperature survey period. (This will be done only on systems that are totally operational).

**3.2 AIR SYSTEMS PROCEDURES**

- A. The TAB Agency shall perform the following tests and balance the air systems in accordance with the following requirements:
  - 1. Test and adjust blower and motor rpm to design requirements.
  - 2. Test and record motor full load amperes and corresponding voltage.
  - 3. Make pitot tube traverse of main supply ducts and obtain design cfm at fans.
  - 4. Test and record system static pressures, suction and discharge.
  - 5. Test and adjust system for design cfm of outside air.
  - 6. Test and record entering and leaving air dry bulb temperatures of all heating and cooling coils.
  - 7. Test and record entering and leaving wet bulb temperatures of all cooling coils.
  - 8. Adjust all main supply and return air ducts to proper design cfm. System supply airflow, system return airflow, and system outdoor airflow shall be balanced to within 5% of the design requirement.
  - 9. Adjust all zones to proper design cfm, supply and return.
  - 10. Test and adjust each diffuser, grille, and register to within 10% of design requirement.
  - 11. Each grille, diffuser, and register shall be identified as to location and area.
  - 12. Size, type, and manufacturer of diffusers, grilles, registers, and all tested equipment shall be identified and listed. Manufacturer's ratings on all equipment shall be used to make required calculations.
  - 13. Readings and test of diffusers, grilles, and registers shall include required fpm velocity and test resultant velocity, required cfm and test resultant cfm after adjustments.
  - 14. TAB Agency shall check all controls to ensure they are operating as specified. Provide the control contractor with specific set points.

**3.3 TEMPERATURE CONTROL SYSTEM**

- A. In the progress of performing the TAB work, the TAB Agency shall:

1. Work with the Controls Contractor to ensure the most effective total system operation within the design limitations, and to obtain mutual understanding of intended control performance.
  2. Verify that all control devices are properly connected.
  3. Verify that all dampers and other controlled devices are operated by the intended controller.
  4. Verify that all dampers are in the position indicated by the controller (open, closed, or modulating).
  5. Verify that the integrity of dampers in terms of tightness of close-off and full-open position. This includes dampers in multi-zone units.
  6. Verify the calibration of all controllers.
  7. Check the locations of all thermostats and humidistats for potential erratic operation from outside influences such as sunlight, drafts, or cold walls.
  8. Check the locations of all sensors to determine whether their position will allow them to sense only the intended temperatures or pressures of the media. Controls Contractor will relocate as deemed necessary by the TAB Agency.
  9. Verify that all controller set points meet the design intent.
  10. Check all dampers for free travel.
  11. Verify the operation of all interlock systems.
  12. Perform all system verification to assure the safety of the system and its components.
- B. A systematic check of the above requirements shall be included in the final TAB report.

### **3.4 TEST AND BALANCE REPORT**

- A. The report shall contain the following data:
1. A listing of the measured air quantities at each outlet corresponding to the temperature tabulation specified above.
  2. Air quantities at each return and exhaust air handling device (only if ducted return systems).
  3. Static pressure readings entering and leaving each supply, return and exhaust fan and filter of the system. These readings shall be related to fan curves in terms of cfm handled.
  4. Motor current readings at each fan. The voltages at the time of the readings shall be listed.

### **3.5 FINAL ACCEPTANCE**

- A. At the time of final inspection, the Balancing Agency shall recheck, in the presence of the Owner's Representative, specific and random selections of data, i.e., water and air quantities, recorded in the Certified Report.

- B. Points and areas for recheck shall be selected by the Owner's Representative.
- C. Measurement and test procedures shall be the same as approved for work forming basis of Certified Report.
- D. Selections for recheck, specific plus random, will not normally exceed 25% of the total number tabulated in the report, except that special air systems may require a complete recheck for safety reasons.
- E. If random tests elicit a measured flow deviation of 10% or more from that recorded in the Certified Report on 10% or more of the selected recheck stations, the report shall be automatically rejected. In the event the report is rejected, all systems shall be readjusted and tested, new data recorded, new Certified Report submitted, and new inspection tests made, all at no additional cost to the Owner.
- F. Following final acceptance of the Certified Report by the Owner's Representative, the settings of all valves, splitter, dampers, and other adjustment devices shall be permanently marked by the TAB Agency, so that adjustment can be restored if disturbed at any time. Devices shall not be marked until after final acceptance.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED DOCUMENTS**

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

### **1.2 SUMMARY**

- A. Section Includes:
  - 1. Copper building wire rated 600 V or less.
  - 2. Aluminum building wire rated 600 V or less.
  - 3. Metal-clad cable, Type MC, rated 600 V or less.
  - 4. Armored cable, Type AC, rated 600 V or less.
  - 5. Photovoltaic cable, Type PV, rated 2000 V or less.
  - 6. Mineral-insulated cable, Type MI, rated 600 V or less.
  - 7. Tray cable, Type TC, rated 600 V or less.
  - 8. Connectors, splices, and terminations rated 600 V and less.

### **1.3 DEFINITIONS**

- A. RoHS: Restriction of Hazardous Substances.
- B. VFC: Variable-frequency controller.

### **1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Product Schedule: Indicate type, use, location, and termination locations.

### **1.5 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For testing agency.
- B. Field quality-control reports.

### **1.6 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: Member Company of NETA.
  - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

## PART 2 - PRODUCTS

### 2.1 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Alpha Wire Company.
  - 2. American Bare Conductor.
  - 3. Belden Inc.
  - 4. Cerro Wire LLC.
  - 5. Encore Wire Corporation.
  - 6. General Cable Technologies Corporation.
  - 7. Okonite Company (The).
  - 8. Service Wire Co.
  - 9. Southwire Company.
- C. Standards:
  - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
  - 2. RoHS compliant.
  - 3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- E. Conductor Insulation:
  - 1. Type NM: Comply with UL 83 and UL 719.
  - 2. Type RHH and Type RHW-2: Comply with UL 44.
  - 3. Type USE-2 and Type SE: Comply with UL 854.
  - 4. Type TC-ER: Comply with NEMA WC 70/ICEA S-95-658 and UL 1277.
  - 5. Type THHN and Type THWN-2: Comply with UL 83.
  - 6. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
  - 7. Type UF: Comply with UL 83 and UL 493.

8. Type XHHW-2: Comply with UL 44.

F. Shield:

1. Type TC-ER: Cable designed for use with VFCs, with oversized crosslinked polyethylene insulation, spiral-wrapped foil plus 85 percent coverage braided shields and insulated full-size ground wire, and sunlight- and oil-resistant outer PVC jacket.

## 2.2 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AFC Cable.
2. American Bare Conductor.
3. Belden Inc.
4. Cerro Wire LLC.
5. Encore Wire Corporation.
6. General Cable Technologies Corporation.
7. Okonite Company (The).
8. Service Wire Co.
9. Southwire Company.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 1569.
3. RoHS compliant.
4. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Circuits:

1. Single circuit with color-coded conductors.
2. Power-Limited Fire-Alarm Circuits: Comply with UL 1424.

E. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.



- F. Ground Conductor: Insulated
- G. Conductor Insulation:
  - 1. Type TFN/THHN/THWN-2: Comply with UL 83.
  - 2. Type XHHW-2: Comply with UL 44.
- H. Armor: Aluminum, interlocked.
- I. Jacket: PVC applied over armor.

### **2.3 CONNECTORS AND SPLICES**

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. 3M Electrical Products.
  - 2. AFC Cable Systems; a part of Atkore International.
  - 3. Gardner Bender.
  - 4. Hubbell Power Systems, Inc.
  - 5. Ideal Industries, Inc.
  - 6. ILSCO.
  - 7. NSi Industries LLC.
  - 8. O-Z/Gedney; a brand of Emerson Industrial Automation.
  - 9. Service Wire Co.
  - 10. TE Connectivity Ltd.
- C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.
- D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
  - 1. Material: Copper.
  - 2. Type: Two hole with standard barrels.
  - 3. Termination: Compression.

### **PART 3 – EXECUTION**

### 3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Feeders: Copper for feeders smaller than No. 4 AWG; copper or aluminum for feeders No. 4 AWG and larger. Conductors shall be solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- C. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- D. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.
- E. VFC Output Circuits Cable: Extra-flexible stranded for all sizes.
- F. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

### 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN/THWN-2, single conductors in raceway.
- B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.
- E. Feeders Installed below Raised Flooring: Type THHN/THWN-2, single conductors in raceway.
- F. Feeders in Cable Tray: Type THHN/THWN-2, single conductors in raceway.
- G. Exposed Branch Circuits, Including in Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- H. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.
- I. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.
- J. Branch Circuits Installed below Raised Flooring: Type THHN/THWN-2, single conductors in raceway.
- K. Branch Circuits in Cable Tray: Type THHN/THWN-2, single conductors in raceway.
- L. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- M. VFC Output Circuits: Type XHHW-2 in metal conduit.

### **3.3 INSTALLATION OF CONDUCTORS AND CABLES**

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 26 05 33 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section 26 05 29 "Hangers and Supports for Electrical Systems."
- G. Complete cable tray systems installation according to Section 26 05 36 "Cable Trays for Electrical Systems" prior to installing conductors and cables.

### **3.4 CONNECTIONS**

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
  - 1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

### **3.5 IDENTIFICATION**

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

### **3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS**

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

### **3.7 FIRESTOPPING**

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 07 84 13 "Penetration

Firestopping."

### 3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- D. Perform tests and inspections with the assistance of a factory-authorized service representative.
  - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
  - 2. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors and conductors feeding the following critical equipment and services for compliance with requirements:
  - 3. Perform each of the following visual and electrical tests:
    - a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
    - b. Test bolted connections for high resistance using one of the following:
      - i. A low-resistance ohmmeter.
      - ii. Calibrated torque wrench.
      - iii. Thermographic survey.
    - c. Inspect compression-applied connectors for correct cable match and indentation.
    - d. Inspect for correct identification.
    - e. Inspect cable jacket and condition.
    - f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.
    - g. Continuity test on each conductor and cable.
    - h. Uniform resistance of parallel conductors.
  - 4. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.
    - a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

- b. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- 5. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.
- E. Cables will be considered defective if they do not pass tests and inspections.
- F. Prepare test and inspection reports to record the following:
  - 1. Procedures used.
  - 2. Results that comply with requirements.
  - 3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED DOCUMENTS**

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

### **1.2 SUMMARY**

- A. Section includes grounding and bonding systems and equipment, plus the following special applications:
  - 1. Underground distribution grounding.
  - 2. Ground bonding common with lightning protection system.
  - 3. Foundation steel electrodes.

### **1.3 GROUNDING ELECTRODES**

- A. General: Provide a grounding electrode system, as described in NEC 250, as specified herein and as indicated on plans.
- B. Ground Field / Ground Rods: The ground field shall consist of three 20 ft long vertically driven ground rods arranged in a triangular pattern spaced 20 feet apart. Additional ground rods shall be added as necessary to achieve the desired resistance.
- C. Main Metallic Water Pipe: The building's main metallic underground water piping shall be utilized as a grounding electrode, provided the metal pipe is installed in direct contact with the earth for a minimum of 10 feet. Bond the main metallic water service within 5 ft. of the entrance of the water pipe into the building.
- D. Building Steel: The building steel shall be utilized as a grounding electrode, provided the steel is in direct contact with the earth or is otherwise effectively grounded.
- E. Rebar: In concrete buildings, provide a bond to rebar in concrete.
- F. Resistance: Grounding electrode resistance shall not exceed 10 ohms. The overall resistance of the entire grounding electrode system shall not exceed 5 ohms. Provide additional grounding electrodes as required to meet this value.

### **1.4 GROUNDING ELECTRODE CONDUCTOR**

- A. Grounding Electrode Conductor: A main grounding electrode conductor, bare copper, sized per NEC (minimum size #1/0 AWG), shall be run in PVC conduit from the main service equipment to the grounding electrodes. This conductor shall also be bonded to the following:
  - 1. Telecommunications service ground within 20' of the electrical service
  - 2. Lightning protection system.
  - 3. Gas and other interior metal piping – refer to NEC.

### **1.5 SEPARATELY DERIVED GROUNDING SYSTEMS**

- A. Description: Provide a separately derived grounding system where indicated herein and as required by the National Electrical Code. Bond neutral and ground busses together.
- B. Services: Provide a separately derived grounding system for all building electrical services and step-down transformers.
- C. Emergency Generator: Provide a separately derived grounding system for the emergency system where 4-pole transfer switches are used (neutral and phase conductors switched).
- D. Multiple Buildings: Multiple buildings fed from the same electrical service shall be provided with separate grounding electrode systems, as required by the NEC and specified herein.

#### **1.6 BONDING AND EQUIPMENT GROUNDING**

- A. Description of System: In general, all electrical equipment (metallic conduit, motor frames, panelboards, etc.) shall be bonded together with a green insulated copper system grounding conductor in accordance with specific rules of Article 250 of the NEC. Equipment grounding conductors through the raceway system shall be continuous from main switch ground bus to panel ground bar of each panelboard, and from panel grounding bar of each panelboard to branch circuit equipment and devices.
- B. Equipment Grounding Conductors: All raceways shall have an insulated copper system ground conductor run throughout the entire length of the circuit installed within conduit in strict accordance with NEC. Grounding conductor shall be included in total conduit fill when determining conduit sizes, even though not included or shown on drawings.
- C. Redundant Grounding: In general all branch circuits shall be provided with a redundant grounding system through the use of grounding conductors and metallic conduit.
- D. Bonding: In addition to connections to grounding electrodes, the main service ground shall be bonded to the lightning protection system and other underground metal piping.
- E. Light Poles: All exterior light poles shall have their enclosures grounded directly to a separate driven ground at the light pole in addition to the building ground connection, via the circuit equipment ground conductor.
- F. Bushings: Provide insulated grounding bushings on all metallic feeder conduits terminated within panelboards, switchboards or enclosed overcurrent devices. Provide insulated grounding bushings on all branch circuit conduits where concentric knockouts are used.
- G. Connection to Other Systems: Provide all required grounding and bonding connections as specified herein and as required by the National Electrical Code.

#### **1.7 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.

#### **1.8 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Plans showing dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:
  - 1. Test wells.

2. Ground rods.
  3. Ground rings.
  4. Grounding arrangements and connections for separately derived systems.
- B. Qualification Data: For testing agency and testing agency's field supervisor.
- C. Field quality-control reports.

### **1.9 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.
1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
    - a. Plans showing as-built, dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:
      - i. Test wells.
      - ii. Ground rods.
      - iii. Ground rings.
      - iv. Grounding arrangements and connections for separately derived systems.
    - b. Instructions for periodic testing and inspection of grounding features at test wells ground rings grounding connections for separately derived systems based on NETA MTS.
      - i. Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
      - ii. Include recommended testing intervals.

### **1.10 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: Certified by NETA.

## **PART 2 - PRODUCTS**

### **2.1 SYSTEM DESCRIPTION**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

### **2.2 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Advanced Lightning Technology, Ltd.



2. Burndy; Part of Hubbell Electrical Systems.
3. Dossert; AFL Telecommunications LLC.
4. ERICO International Corporation.
5. Fushi Copperweld Inc.
6. Galvan Industries, Inc.; Electrical Products Division, LLC.
7. Harger Lightning & Grounding.
8. ILSCO.
9. O-Z/Gedney; a brand of Emerson Industrial Automation.
10. Robbins Lightning, Inc.
11. Siemens Industry, Inc., Energy Management Division.

### **2.3 CONDUCTORS**

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
  1. Solid Conductors: ASTM B 3.
  2. Stranded Conductors: ASTM B 8.
  3. Tinned Conductors: ASTM B 33.
  4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
  5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
  6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
  7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
- C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.
- D. Lead Content: Less than 300 parts per million.

### **2.4 CONNECTORS**

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

- B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- C. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to the ground bus bar.
- D. Bus-Bar Connectors: Compression type, copper or copper alloy, with two wire terminals.
- E. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated, or silicon bronze bolts.
- F. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- G. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.
- H. Conduit Hubs: Mechanical type, terminal with threaded hub.
- I. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
- J. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
- K. Lay-in Lug Connector: Mechanical type, aluminum terminal with set screw.
- L. Service Post Connectors: Mechanical type, bronze alloy terminal, in short- and long-stud lengths, capable of single and double conductor connections.
- M. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.
- N. Straps: Solid copper, cast-bronze clamp. Rated for 600 A.
- O. Tower Ground Clamps: Mechanical type, copper or copper alloy, terminal two-piece clamp.
- P. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.
- Q. Water Pipe Clamps:
  - 1. Mechanical type, two pieces with stainless-steel bolts.
    - a. Material: Tin-plated aluminum.
    - b. Listed for direct burial.
  - 2. U-bolt type with malleable-iron clamp and copper ground connector.
- R. Lead Content: Less than 300 parts per million.

## 2.5 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel, sectional type; 3/4 inch by 10 feet.
- B. Chemical-Enhanced Grounding Electrodes: Copper tube, straight or L-shaped, charged with nonhazardous electrolytic chemical salts.
  - 1. Termination: Factory-attached No. 4/0 AWG bare conductor at least 48 inches long.

- 2. Backfill Material: Electrode manufacturer's recommended material.
- C. Ground Plates: 1/4 inch thick, hot-dip galvanized.

### **PART 3 - EXECUTION**

#### **3.1 APPLICATIONS**

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.
  - 1. Bury at least 24 inches below grade.
  - 2. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.
- C. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- D. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
  - 1. Install bus horizontally, on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.
  - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.
- E. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
  - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
  - 4. Connections to Structural Steel: Welded connectors.

#### **3.2 GROUNDING AT THE SERVICE**

- A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

#### **3.3 GROUNDING SEPARATELY DERIVED SYSTEMS**

- A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

### 3.4 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.
- B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches will extend above finished floor. If necessary install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches above to 6 inches below concrete. Seal floor opening with waterproof, non-shrink grout.
- C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.
- D. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned- copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than 6 inches from the foundation. Installation of pad shall be in compliance with utility company's grounding standard.

### 3.5 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
  - 1. Feeders and branch circuits.
  - 2. Lighting circuits.
  - 3. Receptacle circuits.
  - 4. Single-phase motor and appliance branch circuits.
  - 5. Three-phase motor and appliance branch circuits.
  - 6. Flexible raceway runs.
  - 7. Armored and metal-clad cable runs.
  - 8. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and

to air duct and connected metallic piping.

- D. Water Heater, Heat-Tracing, and Anti-frost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- E. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.
- F. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.
- G. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.
- H. Metallic Fences: Comply with requirements of IEEE C2.
  - 1. Grounding Conductor: Bare, tinned copper, not less than No. 8 AWG.
  - 2. Gates: Shall be bonded to the grounding conductor with a flexible bonding jumper.
  - 3. Barbed Wire: Strands shall be bonded to the grounding conductor.

### **3.6 INSTALLATION**

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.
- C. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
  - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
  - 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- D. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are

specified in Section 26 05 43 "Underground Ducts and Raceways for Electrical Systems," and shall be at least 12 inches deep, with cover.

1. Install at least one test well for each service unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
- E. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
  2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
  3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- F. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
  2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
  3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- G. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.
- H. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet apart.
- I. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel column, extending around the perimeter of building.
1. Install tinned-copper conductor not less than No. 2/0 AWG for ground ring and for taps to building steel.
  2. Bury ground ring not less than 24 inches from building's foundation.
- J. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; use a minimum of 20 feet of bare copper conductor not smaller than No. 4 AWG.
1. If concrete foundation is less than 20 feet long, coil excess conductor within base of foundation.

2. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.
  
- K. Concrete-Encased Grounding Electrode (Ufer Ground): Fabricate according to NFPA 70; using electrically conductive coated steel reinforcing bars or rods, at least 20 feet long. If reinforcing is in multiple pieces, connect together by the usual steel tie wires or exothermic welding to create the required length.

### 3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- D. Perform tests and inspections with the assistance of a factory-authorized service representative.
- E. Tests and Inspections:
  1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
  2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
  3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
    - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    - b. Perform tests by fall-of-potential method according to IEEE 81.
  4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- F. Grounding system will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.
- H. Report measured ground resistances that exceed the following values:
  1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10ohms.

2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
  3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
  4. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).
  5. Substations and Pad-Mounted Equipment: 5 ohms.
  6. Manhole Grounds: 10 ohms.
- I. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

**END OF SECTION**



**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:
1. Steel slotted support systems.
  2. Aluminum slotted support systems.
  3. Nonmetallic slotted support systems.
  4. Conduit and cable support devices.
  5. Support for conductors in vertical conduit.
  6. Structural steel for fabricated supports and restraints.
  7. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
  8. Fabricated metal equipment support assemblies.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Suspended ceiling components.
  2. Ductwork, piping, fittings, and supports.
  3. Structural members to which hangers and supports will be attached.
  4. Size and location of initial access modules for acoustical tile.
  5. Items penetrating finished ceiling, including the following:
    - a. Luminaires.
    - b. Air outlets and inlets.
    - c. Speakers.
    - d. Sprinklers.
    - e. Access panels.

- f. Projectors.
- B. Welding certificates.

#### 1.4 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M.
  - 2. AWS D1.2/D1.2M.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design hanger and support system.
- B. Seismic Performance: Hangers and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 1. The term "withstand" means "the supported equipment and systems will remain in place without separation of any parts when subjected to the seismic forces specified and the supported equipment and systems will be fully operational after the seismic event."
  - 2. Component Importance Factor: 1.5.
- C. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame Rating: Class 1.
  - 2. Self-extinguishing according to ASTM D 635.

#### 2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch- diameter holes at a maximum of 8 inches o.c. in at least one surface.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allied Tube & Conduit; a part of Atkore International.
    - b. B-line, an Eaton business.
    - c. ERICO International Corporation.
    - d. Flex-Strut Inc.
    - e. Gripple Inc.

- f. GS Metals Corp.
  - g. G-Strut.
  - h. Haydon Corporation.
  - i. Metal Ties Innovation.
  - j. Thomas & Betts Corporation; A Member of the ABB Group.
  - k. Unistrut; Part of Atkore International.
  - l. Wesanco, Inc.
2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
  3. Material for Channel, Fittings, and Accessories: Stainless steel, Type 316.
  4. Channel Width: Selected for applicable load criteria.
  5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
  6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
  7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
  8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Aluminum Slotted Support Systems: Extruded-aluminum channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least one surface.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Cooper Industries, Inc.
    - b. Flex-Strut Inc.
    - c. Haydon Corporation.
    - d. MKT Metal Manufacturing.
    - e. Thomas & Betts Corporation; A Member of the ABB Group.
    - f. Unistrut; Part of Atkore International.
  2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
  3. Channel Material: 6063-T5 aluminum alloy.
  4. Fittings and Accessories Material: 5052-H32 aluminum alloy.

5. Channel Width: Selected for applicable load criteria.
  6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
  7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
  8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - i. Hilti, Inc.
      - ii. ITW Ramset/Red Head; Illinois Tool Works, Inc.
      - iii. MKT Fastening, LLC.
      - iv. Simpson Strong-Tie Co., Inc.
  2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - i. B-line, an Eaton business.
      - ii. Empire Tool and Manufacturing Co., Inc.
      - iii. Hilti, Inc.
      - iv. ITW Ramset/Red Head; Illinois Tool Works, Inc.
      - v. MKT Fastening, LLC.
  3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
  4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.

5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: Stainless-steel springhead type.
7. Hanger Rods: Threaded steel.

### 2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Section 05 50 00 "Metal Fabrications" for steel shapes and plates.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
  1. NECA 1.
  2. NECA 101.
  3. NECA 105.
- B. Comply with requirements in Section 07 84 13 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- C. Comply with requirements for raceways and boxes specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."
- D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
  1. Secure raceways and cables to these supports with two-bolt conduit clamps.

### 3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

- C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - 1. To Wood: Fasten with lag screws or through bolts.
  - 2. To New Concrete: Bolt to concrete inserts.
  - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  - 4. To Existing Concrete: Expansion anchor fasteners.
  - 5. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
  - 6. To Light Steel: Sheet metal screws.
  - 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

### **3.3 INSTALLATION OF FABRICATED METAL SUPPORTS**

- A. Comply with installation requirements in Section 05 50 00 "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

### **3.4 CONCRETE BASES**

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 03 30 00 "Cast-in-Place Concrete."
- C. Anchor equipment to concrete base as follows:
  - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
  - 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

### **3.5 PAINTING**

- A. Touchup: Comply with requirements in Section 09 91 13 "Exterior Painting" and Section 099600 "High-Performance Coatings" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED DOCUMENTS**

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

### **1.2 SUMMARY**

- A. Section Includes:
  - 1. Metal conduits and fittings.
  - 2. Nonmetallic conduits and fittings.
  - 3. Metal wireways and auxiliary gutters.
  - 4. Nonmetal wireways and auxiliary gutters.
  - 5. Surface raceways.
  - 6. Boxes, enclosures, and cabinets.
  - 7. Handholes and boxes for exterior underground cabling.

### **1.3 DEFINITIONS**

- A. GRC: Galvanized rigid steel conduit.
- B. IMC: Intermediate metal conduit.

### **1.4 ACTION SUBMITTALS**

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.
- C. Samples: For wireways and for each color and texture specified, 12 inches long.

### **1.5 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
  - 1. Structural members in paths of conduit groups with common supports.
  - 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- B. Seismic Qualification Data: Certificates, for enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.



1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
  4. Detailed description of conduit support devices and interconnections on which the certification is based and their installation requirements.
- C. Source quality-control reports.

## **PART 2 - PRODUCTS**

### **2.1 METAL CONDUITS AND FITTINGS**

- A. Metal Conduit:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. AFC Cable Systems; a part of Atkore International.
    - b. Allied Tube & Conduit; a part of Atkore International.
    - c. Anamet Electrical, Inc.
    - d. Calconduit.
    - e. Electri-Flex Company.
    - f. FSR Inc.
    - g. Korkap.
    - h. NEC, Inc.
    - i. Opti-Com Manufacturing Network, Inc (OMNI).
    - j. O-Z/Gedney; a brand of Emerson Industrial Automation.
    - k. Patriot Aluminum Products, LLC.
    - l. Perma-Cote.
    - m. Picoma Industries, Inc.
    - n. Plasti-Bond.
    - o. Republic Conduit.
    - p. Southwire Company.

- q. Thomas & Betts Corporation; A Member of the ABB Group.
  - r. Topaz Electric; a division of Topaz Lighting Corp.
  - s. Western Tube and Conduit Corporation.
2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  3. GRC: Comply with ANSI C80.1 and UL 6.
  4. IMC: Comply with ANSI C80.6 and UL 1242.
  5. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
    - a. Comply with NEMA RN 1.
    - b. Coating Thickness: 0.040 inch, minimum.
  6. EMT: Comply with ANSI C80.3 and UL 797.
  7. FMC: Comply with UL 1; zinc-coated steel.
  8. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- B. Metal Fittings:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. AFC Cable Systems; a part of Atkore International.
    - b. Allied Tube & Conduit; a part of Atkore International.
    - c. Anamet Electrical, Inc.
    - d. Calconduit.
    - e. Electri-Flex Company.
    - f. FSR Inc.
    - g. Korkap.
    - h. NEC, Inc.
    - i. NewBasis.
    - j. Opti-Com Manufacturing Network, Inc (OMNI).
    - k. O-Z/Gedney; a brand of Emerson Industrial Automation.
    - l. Patriot Aluminum Products, LLC.
    - m. Perma-Cote.

- n. Picoma Industries, Inc.
  - o. Plasti-Bond.
  - p. Republic Conduit.
  - q. Southwire Company.
  - r. Thomas & Betts Corporation; A Member of the ABB Group.
  - s. Topaz Electric; a division of Topaz Lighting Corp.
  - t. Western Tube and Conduit Corporation.
- 2. Comply with NEMA FB 1 and UL 514B.
  - 3. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - 4. Fittings, General: Listed and labeled for type of conduit, location, and use.
  - 5. Fittings for EMT:
    - a. Material: Steel.
    - b. Type: Setscrew.
  - 6. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
  - 7. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.
- C. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

## 2.2 NONMETALLIC CONDUITS AND FITTINGS

- A. Nonmetallic Conduit:
- 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. AFC Cable Systems; a part of Atkore International.
    - b. Anamet Electrical, Inc.
    - c. Arnco Corporation.
    - d. CANTEX INC.
    - e. CertainTeed Corporation.

- f. Champion Fiberglass, Inc.
  - g. Condux International, Inc.
  - h. Electri-Flex Company.
  - i. FRE Composites.
  - j. Kraloy.
  - k. Lamson & Sessions.
  - l. Niedax Inc.
  - m. RACO; Hubbell.
  - n. Thomas & Betts Corporation; A Member of the ABB Group.
  - o. Topaz Electric; a division of Topaz Lighting Corp.
- 2. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - 3. Fiberglass:
    - a. Comply with NEMA TC 14.
    - b. Comply with UL 2515 for aboveground raceways.
    - c. Comply with UL 2420 for belowground raceways.
  - 4. ENT: Comply with NEMA TC 13 and UL 1653.
  - 5. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
  - 6. LFNC: Comply with UL 1660.
  - 7. Rigid HDPE: Comply with UL 651A.
  - 8. Continuous HDPE: Comply with UL 651A.
  - 9. RTRC: Comply with UL 2515A and NEMA TC 14.
- B. Nonmetallic Fittings:
- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. AFC Cable Systems; a part of Atkore International.
    - b. Anamet Electrical, Inc.
    - c. Arnco Corporation.

- d. CANTEX INC.
  - e. CertainTeed Corporation.
  - f. Champion Fiberglass, Inc.
  - g. Condux International, Inc.
  - h. Electri-Flex Company.
  - i. FRE Composites.
  - j. Kraloy.
  - k. Lamson & Sessions.
  - l. Niedax Inc.
  - m. RACO; Hubbell.
  - n. Thomas & Betts Corporation; A Member of the ABB Group.
  - o. Topaz Electric; a division of Topaz Lighting Corp.
- 2. Fittings, General: Listed and labeled for type of conduit, location, and use.
  - 3. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
    - a. Fittings for LFNC: Comply with UL 514B.
  - 4. Solvents and Adhesives: As recommended by conduit manufacturer.
  - 5. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

### **2.3 METAL WIREWAYS AND AUXILIARY GUTTERS**

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. B-line, an Eaton business.
  - 2. Hoffman; a brand of Pentair Equipment Protection.
  - 3. MonoSystems, Inc.
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 Type 3R unless otherwise indicated, and sized according to NFPA 70.
  - 1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Hinged type unless otherwise indicated.
- E. Finish: Manufacturer's standard enamel finish.

#### **2.4 NONMETALLIC WIREWAYS AND AUXILIARY GUTTERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Allied Moulded Products, Inc.
  - 2. Hoffman; a brand of Pentair Equipment Protection.
  - 3. Lamson & Sessions.
- B. Listing and Labeling: Nonmetallic wireways and auxiliary gutters shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Description: PVC, extruded and fabricated to required size and shape, and having snap-on cover, mechanically coupled connections, and plastic fasteners.
- D. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.
- E. Solvents and Adhesives: As recommended by conduit manufacturer.
  - 1. VOC Content: 510 g/L or less for PVC conduit and fittings.

#### **2.5 SURFACE RACEWAYS**

- A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Hubbell Incorporated; Wiring Device-Kellems.
    - b. MonoSystems, Inc.
    - c. Panduit Corp.
- C. Surface Nonmetallic Raceways: Two- or three-piece construction, complying with UL 5A, and manufactured of rigid PVC with texture and color selected by Architect from manufacturer's standard colors. Product shall comply with UL 94 V-0 requirements for self-

extinguishing characteristics.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Hubbell Incorporated.
  - b. MonoSystems, Inc.
  - c. Panduit Corp.
- D. Tele-Power Poles:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. MonoSystems, Inc.
    - b. Panduit Corp.
  2. Material: Galvanized steel with ivory baked-enamel finish.
  3. Fittings and Accessories: Dividers, end caps, covers, cutouts, wiring harnesses, devices, mounting materials, and other fittings shall match and mate with tele-power pole as required for complete system.

## **2.6 BOXES, ENCLOSURES, AND CABINETS**

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  1. Adalet.
  2. Crouse-Hinds, an Eaton business.
  3. EGS/Appleton Electric.
  4. Erickson Electrical Equipment Company.
  5. FSR Inc.
  6. Hoffman; a brand of Pentair Equipment Protection.
  7. Hubbell Incorporated.
  8. Hubbell Incorporated; Wiring Device-Kellems.
  9. Kraloy.
  10. Milbank Manufacturing Co.
  11. MonoSystems, Inc.
  12. Oldcastle Enclosure Solutions.

13. O-Z/Gedney; a brand of Emerson Industrial Automation.
  14. Plasti-Bond.
  15. RACO; Hubbell.
  16. Spring City Electrical Manufacturing Company.
  17. Stahlin Non-Metallic Enclosures.
  18. Thomas & Betts Corporation; A Member of the ABB Group
  19. Topaz Electric; a division of Topaz Lighting Corp.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.
- E. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- F. Metal Floor Boxes:
1. Material: Cast metal or sheet metal.
  2. Type: Fully adjustable.
  3. Shape: Rectangular.
  4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- G. Nonmetallic Floor Boxes: Nonadjustable, round.
1. Listing and Labeling: Nonmetallic floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- H. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- I. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb.
1. Listing and Labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- J. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- K. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast



aluminum with gasketed cover.

- L. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- M. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- N. Gangable boxes are allowed.
- O. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.
  - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
  - 2. Nonmetallic Enclosures: Fiberglass.
  - 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- P. Cabinets:
  - 1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
  - 2. Hinged door in front cover with flush latch and concealed hinge.
  - 3. Key latch to match panelboards.
  - 4. Metal barriers to separate wiring of different systems and voltage.
  - 5. Accessory feet where required for freestanding equipment.
  - 6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## **2.7 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING**

- A. General Requirements for Handholes and Boxes:
  - 1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
  - 2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Armorcast Products Company.
    - b. NewBasis.

- c. Oldcastle Enclosure Solutions.
- d. Oldcastle Precast, Inc.
- 2. Standard: Comply with SCTE 77.
- 3. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
- 4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
- 5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
- 6. Cover Legend: Molded lettering, "ELECTRIC."
- 7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
- 8. Handholes 12 Inches Wide by 24 Inches Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

## **2.8 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES**

- A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
  - 1. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
  - 2. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012 and traceable to NIST standards.

## **PART 3 - EXECUTION**

### **3.1 RACEWAY APPLICATION**

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
  - 1. Exposed Conduit: GRC RNC, or Type EPC-40-PVC.
  - 2. Concealed Conduit, Aboveground: GRC.
  - 3. Underground Conduit: RNC, Type EPC-40-PVC.
  - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
  - 6. Boxes and Enclosures, Aboveground: NEMA 250, Type 4.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
  2. Exposed, Not Subject to Severe Physical Damage: EMT.
  3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
    - a. Loading dock.
    - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    - c. Mechanical rooms.
    - d. Gymnasiums.
  4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
  5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
  6. Damp or Wet Locations: GRC.
  7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
  2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
  3. EMT: Use setscrew, steel fittings. Comply with NEMA FB 2.10.
  4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- F. Install surface raceways only where indicated on Drawings.
- G. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

### **3.2 INSTALLATION**

- A. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.
- B. Comply with NECA 1 and NECA 101 for installation requirements except where

requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

- C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.
- D. Do not fasten conduits onto the bottom side of a metal deck roof.
- E. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- F. Complete raceway installation before starting conductor installation.
- G. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- H. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- J. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- K. Support conduit within 12 inches of enclosures to which attached.
- L. Raceways Embedded in Slabs:
  - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
  - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
  - 3. Arrange raceways to keep a minimum of 1 inch of concrete cover in all directions.
  - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
- M. Stub-ups to Above Recessed Ceilings:
  - 1. Use EMT, IMC, or RMC for raceways.
  - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- N. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- O. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

- P. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- Q. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- R. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- S. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- T. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- U. Surface Raceways:
  - 1. Install surface raceway with a minimum 2-inch radius control at bend points.
  - 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- V. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.
- W. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
  - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  - 2. Where an underground service raceway enters a building or structure.
  - 3. Conduit extending from interior to exterior of building.
  - 4. Conduit extending into pressurized duct and equipment.
  - 5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
  - 6. Where otherwise required by NFPA 70.
- X. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- Y. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has a straight-run length that exceeds 100 feet.
  2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
    - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
    - d. Attics: 135 deg F temperature change.
  3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
  4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
  5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
  6. Provide expansion/deflection fitting per NEC 300.4 (H) where raceway crosses structural joint intended for expansion/contraction/deflection to accommodate horizontal and vertical movement.
- Z. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 36 inches of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
  2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- AA. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center or top or bottom of box unless otherwise indicated.
- BB. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a rain-tight connection between box and cover plate or supported equipment and box.
- CC. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- DD. Locate boxes so that cover or plate will not span different building finishes.

- EE. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- FF. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- GG. Set metal floor boxes level and flush with finished floor surface.
- HH. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

### 3.3 INSTALLATION OF UNDERGROUND CONDUIT

#### A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 31 20 00 "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Section 31 20 00 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
  - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
  - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
6. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits but a minimum of 6 inches below grade. Align planks along centerline of conduit.
7. Underground Warning Tape: Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."

### 3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with

connecting conduits to minimize bends and deflections required for proper entrances.

- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.
- D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.
- E. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

### **3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS**

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

### **3.6 FIRESTOPPING**

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 07 84 13 "Penetration Firestopping."

### **3.7 PROTECTION**

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

**END OF SECTION**



**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings, Owner's General Conditions of the Contract, and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Color and legend requirements for raceways, conductors, and warning labels and signs.
  - 2. Labels.
  - 3. Bands and tubes.
  - 4. Tapes and stencils.
  - 5. Tags.
  - 6. Signs.
  - 7. Cable ties.
  - 8. Paint for identification.
  - 9. Fasteners for labels and signs.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for electrical identification products.
- B. Samples: For each type of label and sign to illustrate composition, size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: For each piece of electrical equipment and electrical system components to be an index of nomenclature for electrical equipment and system components used in identification signs and labels. Use same designations indicated on Drawings.
- D. Delegated-Design Submittal: For arc-flash hazard study.

**PART 2 - PRODUCTS**

**2.1 PERFORMANCE REQUIREMENTS**

- A. Comply with NFPA 70.
- B. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

- C. Comply with ANSI Z535.4 for safety signs and labels.
- D. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

## **2.2 COLOR AND LEGEND REQUIREMENTS**

- A. Raceways and Cables Carrying Circuits at 600 V or Less:
  - 1. Black letters on an orange field.
  - 2. Legend: Indicate voltage and system or service type.
- B. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.
  - 1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
  - 2. Colors for 208/120-V Circuits:
    - a. Phase A: Black.
    - b. Phase B: Red.
    - c. Phase C: Blue.
  - 3. Colors for 240-V Circuits:
    - a. Phase A: Black.
    - b. Phase B: Red.
  - 4. Colors for 480/277-V Circuits:
    - a. Phase A: Brown.
    - b. Phase B: Orange.
    - c. Phase C: Yellow.
  - 5. Color for Neutral: White.
  - 6. Color for Equipment Grounds: Bare copper.
  - 7. Colors for Isolated Grounds: Green with white stripe.
- C. Warning Label Colors:

1. Identify system voltage with black letters on an orange background.
- D. Warning labels and signs shall include, but are not limited to, the following legends:
  1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
  2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
- E. Equipment Identification Labels:
  1. Black letters on a white field.

### **2.3 LABELS**

- A. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Champion America.
    - c. emedco.
    - d. Grafoplast Wire Markers.
    - e. HellermannTyton.
    - f. LEM Products Inc.
    - g. Marking Services, Inc.
    - h. Panduit Corp.
- B. Snap-around Labels: Slit, pre-tensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. HellermannTyton.
    - c. Marking Services, Inc.
    - d. Panduit Corp.
- C. Self-Adhesive Wraparound Labels: Preprinted, 3-mil-thick, polyester flexible label with acrylic pressure-sensitive adhesive.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. A'n D Cable Products.
    - b. Brady Corporation.
    - c. Brother International Corporation.
    - d. emedco.
    - e. Grafoplast Wire Markers.
    - f. Ideal Industries, Inc.
    - g. LEM Products Inc.
    - h. Marking Services, Inc.
    - i. Panduit Corp.
  2. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
  3. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.
- D. Self-Adhesive Labels: Polyester, thermal, transfer-printed, 3-mil-thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. A'n D Cable Products.
    - b. Brady Corporation.
    - c. Brother International Corporation.
    - d. emedco.
    - e. Grafoplast Wire Markers.
    - f. HellermannTyton.
    - g. Ideal Industries, Inc.
    - h. LEM Products Inc.
    - i. Marking Services, Inc.

- j. Panduit Corp.
- 2. Minimum Nominal Size:
  - a. 1-1/2 by 6 inches for raceway and conductors.
  - b. 3-1/2 by 5 inches for equipment.
  - c. As required by authorities having jurisdiction.

## 2.4 BANDS AND TUBES

- A. Snap-around, Color-Coding Bands: Slit, pre-tensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameters sized to suit diameters and that stay in place by gripping action.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. HellermannTyton.
    - c. Marking Services, Inc.
- B. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at a maximum of 200 deg F. Comply with UL 224.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Brady Corporation.

## 2.5 TAPES AND STENCILS

- A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Carlton Industries, LP.
    - b. Champion America.
    - c. HellermannTyton.
    - d. Ideal Industries, Inc.
    - e. Marking Services, Inc.
- B. Self-Adhesive Vinyl Tape: Colored, heavy-duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of

the following:

- a. Brady Corporation.
  - b. Carlton Industries, LP.
  - c. emedco.
- C. Tape and Stencil: 4-inch-wide black stripes on 10-inch centers placed diagonally over orange background and are 12 inches wide. Stop stripes at legends.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. HellermannTyton.
    - b. LEM Products Inc.
    - c. Marking Services, Inc.
- D. Floor Marking Tape: 2-inch-wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Carlton Industries, LP.
- E. Underground-Line Warning Tape:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Ideal Industries, Inc.
    - c. LEM Products Inc.
    - d. Marking Services, Inc.
    - e. Reef Industries, Inc.
  2. Tape:
    - a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
    - b. Printing on tape shall be permanent and shall not be damaged by burial operations.
    - c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

3. Color and Printing:
  - a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
  - b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".
  - c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".
4. Tag: Type I:
  - a. Pigmented polyolefin, bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
  - b. Width: 3 inches.
  - c. Thickness: 4 mils.
  - d. Weight: 18.5 lb/1000 sq. ft.
  - e. Tensile according to ASTM D 882: 30 lb/f and 2500 psi.
5. Tag: Type II:
  - a. Multilayer laminate, consisting of high-density polyethylene scrim coated with pigmented polyolefin; bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
  - b. Width: 3 inches.
  - c. Thickness: 12 mils.
  - d. Weight: 36.1 lb/1000 sq. ft.
  - e. Tensile according to ASTM D 882: 400 lb/f and 11,500 psi.
6. Tag: Type ID:
  - a. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
  - b. Width: 3 inches.
  - c. Overall Thickness: 5 mils.
  - d. Foil Core Thickness: 0.35 mil.
  - e. Weight: 28 lb/1000 sq. ft.
  - f. Tensile according to ASTM D 882: 70 lb/f and 4600 psi.
7. Tag: Type IID:

- a. Reinforced, detectable three-layer laminate, consisting of a printed pigmented woven scrim, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
  - b. Width: 3 inches.
  - c. Overall Thickness: 8 mils.
  - d. Foil Core Thickness: 0.35 mil.
  - e. Weight: 34 lb/1000 sq. ft.
  - f. Tensile according to ASTM D 882: 300 lb/f and 12,500 psi.
- F. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

## **2.6 TAGS**

- A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Carlton Industries, LP.
    - c. emedco.
    - d. Marking Services, Inc.
- B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.015 inch thick, color-coded for phase and voltage level, with factory screened permanent designations; punched for use with self-locking cable tie fastener.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Carlton Industries, LP.
    - c. emedco.
    - d. Grafoplast Wire Markers.
    - e. LEM Products Inc.
    - f. Marking Services, Inc.



g. Panduit Corp.

C. Write-on Tags:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Carlton Industries, LP.
  - b. LEM Products Inc.
2. Polyester Tags: 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment.
3. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

## 2.7 SIGNS

A. Baked-Enamel Signs:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Carlton Industries, LP.
  - b. Champion America.
  - c. emedco.
2. Preprinted aluminum signs, high-intensity reflective, punched or drilled for fasteners, with colors, legend, and size required for application.
3. 1/4-inch grommets in corners for mounting.
4. Nominal Size: 7 by 10 inches.

B. Metal-Backed Butyrate Signs:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Brady Corporation.
  - b. Champion America.
  - c. emedco.
2. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
3. 1/4-inch grommets in corners for mounting.
4. Nominal Size: 10 by 14 inches.

- C. Laminated Acrylic or Melamine Plastic Signs:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Carlton Industries, LP.
    - c. emedco.
  - 2. Engraved legend.
  - 3. Thickness:
    - a. For signs up to 20 sq. in., minimum 1/16 inch thick.
    - b. For signs larger than 20 sq. in., 1/8 inch thick.
    - c. Engraved legend with black letters on white face.
    - d. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

## 2.8 CABLE TIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. HellermannTyton.
  - 2. Ideal Industries, Inc.
  - 3. Marking Services, Inc.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
  - 1. Minimum Width: 3/16 inch.
  - 2. Tensile Strength at 73 Deg F according to ASTM D 638: 12,000 psi.
  - 3. Temperature Range: Minus 40 to plus 185 deg F.
  - 4. Color: Black.
- C. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.
  - 1. Minimum Width: 3/16 inch.
  - 2. Tensile Strength at 73 Deg F according to ASTM D 638: 7000 psi.
  - 3. UL 94 Flame Rating: 94V-0.

4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

## 2.9 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

### 3.2 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of each item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.
  1. Secure tight to surface of conductor, cable, or raceway.
- H. System Identification for Raceways and Cables over 600 V: Identification shall completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.
  1. Secure tight to surface of conductor, cable, or raceway.
- I. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control,

and signal connections.

- J. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.
- K. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
- L. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:
  - 1. "EMERGENCY POWER."
  - 2. "POWER."
  - 3. "UPS."
- M. Vinyl Wraparound Labels:
  - 1. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
  - 2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.
- N. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.
- O. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.
- P. Self-Adhesive Labels:
  - 1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
  - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.
- Q. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.
- R. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.
- S. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.
- T. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.
- U. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.

- V. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.
  
- W. Underground Line Warning Tape:
  - 1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.
  - 2. Install underground-line warning tape for direct-buried cables and cables in raceways.
  
- X. Metal Tags:
  - 1. Place in a location with high visibility and accessibility.
  - 2. Secure using UV-stabilized and plenum-rated cable ties.
  
- Y. Nonmetallic Preprinted Tags:
  - 1. Place in a location with high visibility and accessibility.
  - 2. Secure using UV-stabilized and plenum-rated cable ties.
  
- Z. Write-on Tags:
  - 1. Place in a location with high visibility and accessibility.
  - 2. Secure using UV-stabilized and plenum-rated cable ties.
  
- AA. Baked-Enamel Signs:
  - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
  - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on minimum 1-1/2-inch-high sign; where two lines of text are required, use signs minimum 2 inches high.
  
- BB. Metal-Backed Butyrate Signs:
  - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
  - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.
  
- CC. Laminated Acrylic or Melamine Plastic Signs:
  - 1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
  - 2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.

DD. Cable Ties: General purpose, for attaching tags, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

### **3.3 IDENTIFICATION SCHEDULE**

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels.
  1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- D. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:
  1. "EMERGENCY POWER."
  2. "POWER."
  3. "UPS."
- E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use vinyl wraparound labels to identify the phase.
  1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- F. Power-Circuit Conductor Identification, More Than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use write-on tags.
- G. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use write-on tags with the conductor or cable designation, origin, and destination.
- H. Control-Circuit Conductor Termination Identification: For identification at terminations, provide heat-shrink preprinted tubes with the conductor designation.
- I. Auxiliary Electrical Systems Conductor Identification: Marker tape that is uniform and consistent with system used by manufacturer for factory-installed connections.
  1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and

pull points. Identify by system and circuit designation.

- J. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
- K. Concealed Raceways and Duct Banks, More Than 600 V, within Buildings: Apply floor marking tape to the following finished surfaces:
  - 1. Floor surface directly above conduits running beneath and within 12 inches of a floor that is in contact with earth or is framed above unexcavated space.
  - 2. Wall surfaces directly external to raceways concealed within wall.
  - 3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
- L. Workspace Indication: Apply floor marking tape or tape and stencil to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- M. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.
- N. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labels.
  - 1. Apply to exterior of door, cover, or other access.
  - 2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:
    - a. Power-transfer switches.
    - b. Controls with external control power connections.
- O. Operating Instruction Signs: Self-adhesive labels.
- P. Emergency Operating Instruction Signs: Self-adhesive labels Metal-backed, butyrate warning signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.
- Q. Equipment Identification Labels:
  - 1. Indoor Equipment: Self-adhesive label.
  - 2. Outdoor Equipment: Laminated acrylic or melamine sign.
  - 3. Equipment to Be Labeled:
    - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of a self-adhesive, engraved, laminated acrylic or melamine label.
    - b. Enclosures and electrical cabinets.

- c. Access doors and panels for concealed electrical items.
- d. Switchboards.
- e. Transformers: Label that includes tag designation indicated on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
- f. Emergency system boxes and enclosures.
- g. Enclosed switches.
- h. Enclosed circuit breakers.
- i. Enclosed controllers.
- j. Variable-speed controllers.
- k. Push-button stations.
- l. Contactors.
- m. Remote-controlled switches, dimmer modules, and control devices.
- n. Battery-inverter units.
- o. Battery racks.
- p. Power-generating units.
- q. Monitoring and control equipment.
- r. UPS equipment.

**END OF SECTION**



## **PART 1 - GENERAL**

### **1.1 RELATED DOCUMENTS**

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

### **1.2 SUMMARY**

- A. Section Includes:
  - 1. Indoor occupancy and vacancy sensors.
  - 2. Switchbox-mounted occupancy sensors.
  - 3. Lighting contactors.
  - 4. Emergency shunt relays.

### **1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings:
  - 1. Show installation details for the following:
    - a. Occupancy sensors.
    - b. Vacancy sensors.
  - 2. Interconnection diagrams showing field-installed wiring.
  - 3. Include diagrams for power, signal, and control wiring.

### **1.4 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Reflected ceiling plan(s) and elevations, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Suspended ceiling components.
  - 2. Structural members to which equipment will be attached.
  - 3. Items penetrating finished ceiling, including the following:
    - a. Luminaires.
    - b. Air outlets and inlets.
    - c. Speakers.
    - d. Sprinklers.

- e. Access panels.
  - f. Control modules.
- B. Field quality-control reports.
- C. Sample Warranty: For manufacturer's warranties.

### **1.5 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For each type of lighting control device to include in operation and maintenance manuals.
- B. Software and Firmware Operational Documentation:
- 1. Software operating and upgrade manuals.
  - 2. Program Software Backup: On USB media. Provide names, versions, and website addresses for locations of installed software.
  - 3. Device address list.
  - 4. Printout of software application and graphic screens.

### **1.6 WARRANTY**

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace lighting control devices that fail(s) in materials or workmanship within specified warranty period.
- 1. Failures include, but are not limited to, the following:
    - a. Faulty operation of lighting control software.
    - b. Faulty operation of lighting control devices.
  - 2. Warranty Period: Two year(s) from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 INDOOR OCCUPANCY AND VACANCY SENSORS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- 1. Bryant Electric.
  - 2. Cooper Industries, Inc.
  - 3. Hubbell Building Automation, Inc.
  - 4. Intermatic, Inc.
  - 5. Leviton Manufacturing Co., Inc.

6. Lithonia Lighting; Acuity Brands Lighting, Inc.
  7. Lutron Electronics Co., Inc.
  8. NSi Industries LLC.
  9. Philips Lighting Controls.
  10. RAB Lighting.
  11. Sensor Switch, Inc.
  12. Square D.
- B. General Requirements for Sensors:
1. Wall or Ceiling-mounted, solid-state indoor occupancy and vacancy sensors.
  2. Dual technology.
  3. Separate power pack.
  4. Hardwired connection to switch; and BAS and lighting control system.
  5. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  6. Operation:
    - a. Combination Sensor: Unless otherwise indicated, sensor shall be programmed to turn lights on when coverage area is occupied and turn them off when unoccupied, or to turn off lights that have been manually turned on; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
  7. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A.
  8. Power: Line voltage.
  9. Power Pack: Dry contacts rated for 20-A LED load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 HP at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
  10. Mounting:
    - a. Sensor: Suitable for mounting in any position on a standard outlet box.
    - b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
    - c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
  11. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.

12. Bypass Switch: Override the "on" function in case of sensor failure.
  13. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; turn lights off when selected lighting level is present.
- C. Dual-Technology Type: Wall or Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.
1. Sensitivity Adjustment: Separate for each sensing technology.
  2. Detector Sensitivity: Detect occurrences of 6-inch-minimum movement of any portion of a human body that presents a target of not less than 36 sq. in., and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
  3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch-high ceiling.
  4. Detection Coverage (Room, Wall Mounted): Detect occupancy anywhere within a 180-degree pattern centered on the sensor over an area of 3000 square feet when mounted 48 inches above finished floor.

## **2.2 SWITCHBOX-MOUNTED OCCUPANCY SENSORS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Bryant Electric.
  2. Cooper Industries, Inc.
  3. Hubbell Building Automation, Inc.
  4. Intermatic, Inc.
  5. Leviton Manufacturing Co., Inc.
  6. Lithonia Lighting; Acuity Brands Lighting, Inc.
  7. Lutron Electronics Co., Inc.
  8. NSi Industries LLC.
  9. Philips Lighting Controls.
  10. RAB Lighting.
  11. Sensor Switch, Inc.
  12. Square D.
- B. General Requirements for Sensors: Automatic-wall-switch occupancy sensor with manual on-off switch, suitable for mounting in a single gang switchbox, with provisions for

connection to BAS.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  2. Occupancy Sensor Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn lights off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
  3. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F.
  4. Switch Rating: Not less than 800-VA LED load at 120 V, 1200-VA LED load at 277 V, and 800-W incandescent.
- C. Wall-Switch Sensor Tag WS1:
1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees.
  2. Sensing Technology: Dual technology - PIR and ultrasonic.
  3. Switch Type: SP.
  4. Capable of controlling load in three-way application.
  5. Voltage: Match the circuit voltage Dual voltage - 120 and 277 V.
  6. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.
  7. Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.
  8. Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.
  9. Color: White.
  10. Faceplate: Color matched to switch.

## **2.3 LIGHTING CONTACTORS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Allen-Bradley/Rockwell Automation.
  2. ASCO: a brand of Vertiv.
  3. Eaton.
  4. General Electric Company.
- B. Description: Electrically operated and mechanically held, combination-type lighting contactors with fusible switch, complying with NEMA ICS 2 and UL 508.
1. Current Rating for Switching: Listing or rating consistent with type of load served,

including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less THD of normal load current).

2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
  3. Enclosure: Comply with NEMA 250.
  4. Provide with control and pilot devices as indicated on Drawings, matching the NEMA type specified for the enclosure.
- C. Interface with DDC System for HVAC: Provide hardware interface to enable the DDC system for HVAC to monitor and control lighting contactors.
1. Monitoring: On-off status.
  2. Control: On-off operation.

## **2.4 EMERGENCY SHUNT RELAY**

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Lighting Control and Design.
- B. Description: NC, electrically held relay, arranged for wiring in parallel with manual or automatic switching contacts; complying with UL 924.
1. Coil Rating: 120 or 277 V.

## **2.5 CONDUCTORS AND CABLES**

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multi-conductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Plenum Rated.
- C. Class 1 Control Cable: Multi-conductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Plenum Rated.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.
- B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 SENSOR INSTALLATION**

- A. Comply with NECA 1.
- B. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
- C. Install and aim sensors in locations to achieve not less than 90-percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

**3.3 CONTACTOR INSTALLATION**

- A. Comply with NECA 1.
- B. Mount electrically held lighting contactors with elastomeric isolator pads to eliminate structure-borne vibration unless contactors are installed in an enclosure with factory-installed vibration isolators.

**3.4 WIRING INSTALLATION**

- A. Comply with NECA 1.
- B. Wiring Method: Comply with Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch.
- C. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and non-power-limited conductors according to conductor manufacturer's written instructions.
- D. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- E. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

**3.5 IDENTIFICATION**

- A. Identify components and power and control wiring according to Section 26 05 53 "Identification for Electrical Systems."
  - 1. Identify controlled circuits in lighting contactors.
  - 2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.
- B. Label time switches and contactors with a unique designation.

**3.6 FIELD QUALITY CONTROL**

- A. Testing Agency: Engage a qualified testing agency to evaluate lighting control devices and perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

- C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
  - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Lighting control devices will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

### **3.7 ADJUSTING**

- A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
  - 1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
  - 2. For daylighting controls, adjust set points and dead-band controls to suit Owner's operations.
  - 3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

### **3.8 SOFTWARE SERVICE AGREEMENT**

- A. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
- B. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
  - 1. Upgrade Notice: At least 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.

### **3.9 DEMONSTRATION**

- A. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control systems specified in Section 26 09 43.16 "Addressable-Luminaire Lighting Controls" and Section 26 09 43.23 "Relay-Based Lighting Controls."
- B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

**END OF SECTION**



**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Standard-grade receptacles, 125 V, 20 A.
  - 2. USB receptacles.
  - 3. GFCI receptacles, 125 V, 20 A.
  - 4. SPD receptacles, 125 V, 20 A.
  - 5. Toggle switches, 120/277 V, 20 A.
  - 6. Decorator-style devices, 20 A.
  - 7. Occupancy sensors.
  - 8. Wall-box dimmers.
  - 9. Wall plates.
  - 10. Floor service fittings.
  - 11. Poke-through assemblies.
  - 12. Prefabricated multi-outlet assemblies.
  - 13. Service poles.

**1.3 DEFINITIONS**

- A. AFCI: Arc-fault circuit interrupter.
- B. BAS: Building automation system.
- C. EMI: Electromagnetic interference.
- D. GFCI: Ground-fault circuit interrupter.
- E. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- F. RFI: Radio-frequency interference.
- G. SPD: Surge protective device.

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.

**1.5 INFORMATIONAL SUBMITTALS**

- A. Field quality-control reports.

**1.6 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing- label warnings and instruction manuals that include labeling conditions.

**1.7 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Service/Power Poles: One for every 10, but no fewer than one.
  - 2. Floor Service-Outlet Assemblies: One for every 10, but no fewer than one.
  - 3. Poke-Through, Fire-Rated Closure Plugs: One for every five-floor service outlets installed, but no fewer than two.
  - 4. SPD Receptacles: One for every 10 of each type installed, but no fewer than two of each type.

**PART 2 - PRODUCTS**

**2.1 GENERAL WIRING-DEVICE REQUIREMENTS**

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Comply with NFPA 70.
- C. RoHS compliant.
- D. Comply with NEMA WD 1.
- E. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
  - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
  - 2. Devices shall comply with requirements in this Section.
- F. Devices for Owner-Furnished Equipment:
  - 1. Receptacles: Match plug configurations.

2. Cord and Plug Sets: Match equipment requirements.
- G. Device Color:
1. Wiring Devices Connected to Normal Power System: White unless otherwise indicated or required by NFPA 70 or device listing.
  2. Wiring Devices Connected to Essential Electrical System: Red.
  3. SPD Devices: Blue.
- H. Wall Plate Color: For plastic covers, match device color.
- I. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

## **2.2 STANDARD-GRADE RECEPTACLES, 125 V, 20 A**

- A. Duplex Receptacles, 125 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Description: Two pole, three wire, and self-grounding.
  3. Configuration: NEMA WD 6, Configuration 5-20R.
  4. Standards: Comply with UL 498 and FS W-C-596.
- B. Tamper-Resistant Duplex Receptacles, 125 V, 20 A:
1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
  2. Configuration: NEMA WD 6, Configuration 5-20R.
  3. Standards: Comply with UL 498 and FS W-C-596.
- C. Weather-Resistant Duplex Receptacle, 125 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate

only when a plug is inserted in the receptacle. Square face.

3. Configuration: NEMA WD 6, Configuration 5-20R.
  4. Standards: Comply with UL 498.
  5. Marking: Listed and labeled as complying with NFPA 70, "Receptacles in Damp or Wet Locations" Article.
- D. Tamper- and Weather-Resistant Duplex Receptacles, 125 V, 20A:
1. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
  2. Configuration: NEMA WD 6, Configuration 5-20R.
  3. Standards: Comply with UL 498.
  4. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

### **2.3 USB RECEPTACLES**

- A. USB Charging Receptacles:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Description: Single-piece, rivet-less, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap.
  3. USB Receptacles: Dual and quad, USB Type A, 5 V dc, and 2.1 A per receptacle (minimum).
  4. Standards: Comply with UL 1310 and USB 3.0 devices.
- B. Tamper-Resistant Duplex and USB Charging Receptacles:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Description: Single-piece, rivet-less, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap. Integral shutters that operate only when a plug is inserted in the line voltage receptacle.

3. Line Voltage Receptacles: Two pole, three wire, and self-grounding; NEMA WD 6, Configuration 5-20R.
4. USB Receptacles: Dual USB Type A, 5 V dc, and 2.1 A per receptacle (minimum).
5. Standards: Comply with UL 498, UL 1310, USB 3.0 devices, and FS W-C-596.

## **2.4 GFCI RECEPTACLES, 125 V, 20 A**

- A. Duplex GFCI Receptacles, 125 V, 20 A:
  1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
  2. Configuration: NEMA WD 6, Configuration 5-20R.
  3. Type: Feed through.
  4. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.
- B. Tamper-Resistant Duplex GFCI Receptacles, 125 V, 20 A:
  1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Hubbell Incorporated; Wiring Device-Kellems.
  2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle.
  3. Configuration: NEMA WD 6, Configuration 5-20R.
  4. Type: Feed through.
  5. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.
  6. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" Article.
- C. Tamper- and Weather-Resistant, GFCI Duplex Receptacles, 125 V, 20 A:
  1. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
  2. Configuration: NEMA WD 6, Configuration 5-15R.
  3. Type: Feed through.
  4. Standards: Comply with UL 498 and UL 943 Class A.
  5. Marking: Listed and labeled as complying with NFPA 70, "Tamper-Resistant Receptacles" and "Receptacles in Damp or Wet Locations" articles.

**2.5 SPD RECEPTACLES, 125 V, 20 A**

- A. Duplex SPD Receptacles, 125 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Description: Two pole, three wire, and self-grounding. Integral SPD in line to ground, line to neutral, and neutral to ground. LED indicator light.
  3. SPD Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 V and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.
  4. Active SPD Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service."
  5. Configuration: NEMA WD 6, Configuration 5-20R.
  6. Standards: Comply with NEMA WD 1, UL 498, UL 1449, and FS W-C-596.
- B. Isolated-Ground Duplex SPD Receptacles, 125 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Description: Two pole, three wire, and self-grounding. Integral SPD in line to ground, line to neutral, and neutral to ground. LED indicator light.
  3. SPD Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 V and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.
  4. Active SPD Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service."
  5. Grounding: Equipment grounding contacts shall be connected only to green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.
  6. Configuration: NEMA WD 6, Configuration 5-20R.

7. Standards: Comply with UL 498, UL 1449, and FS W-C-596.

## **2.6 CORD AND PLUG SETS**

- A. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
- B. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
- C. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

## **2.7 TOGGLE SWITCHES, 120/277 V, 20 A**

- A. Single-Pole Switches, 120/277 V, 20 A:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Standards: Comply with UL 20 and FS W-S-896.
- B. Antimicrobial, Single-Pole Switches, 120/277 V, 20 A:
  1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Eaton (Arrow Hart).
  2. Description: Contact surfaces treated with a coating that kills 99.9 percent of certain common bacteria within two hours when regularly and properly cleaned.
  3. Standards: Comply with UL 20 and FS W-S-896.
- C. Two-Pole Switches, 120/277 V, 20 A:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Comply with UL 20 and FS W-S-896.
- D. Antimicrobial, Double-Pole Switches, 120/277 V, 20 A:
  1. Manufacturers: Subject to compliance with requirements, provide products by the

following:

- a. Eaton (Arrow Hart).
  2. Description: Contact surfaces treated with a coating that kills 99.9 percent of certain common bacteria within two hours when regularly and properly cleaned.
  3. Standards: Comply with UL 20 and FS W-S-896.
- E. Three-Way Switches, 120/277 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Comply with UL 20 and FS W-S-896.
- F. Antimicrobial, Three-Way Switches, 120/277 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Eaton (Arrow Hart).
  2. Description: Contact surfaces treated with a coating that kills 99.9 percent of certain common bacteria within two hours when regularly and properly cleaned.
  3. Standards: Comply with UL 20 and FS W-S-896.
- G. Four-Way Switches, 120/277 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Standards: Comply with UL 20 and FS W-S-896.
- H. Pilot-Light, Single-Pole Switches: 120/277 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.



- c. Leviton Manufacturing Co., Inc.
  2. Description: Illuminated when switch is on.
  3. Standards: Comply with UL 20 and FS W-S-896.
- I. Lighted Single-Pole Switches, 120/277 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Premise Wiring.
    - c. Leviton Manufacturing Co., Inc.
  2. Description: Handle illuminated when switch is on.
  3. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.
- J. Key-Operated, Single-Pole Switches, 120/277 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Description: Factory-supplied key in lieu of switch handle.
  3. Standards: Comply with UL 20 and FS W-S-896.
- K. Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches, 120/277 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
  2. Description: For use with mechanically held lighting contactors.
  3. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.
- L. Key-Operated, Single-Pole, Double-Throw, Momentary-Contact, Center-off Switches, 120/277 V, 20 A:
1. Manufacturers: Subject to compliance with requirements, provide products by one of

the following:

- a. Eaton (Arrow Hart).
  - b. Hubbell Incorporated; Wiring Device-Kellems.
  - c. Leviton Manufacturing Co., Inc.
2. Description: For use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.
  3. Standards: Comply with NEMA WD 1, UL 20, and FS W-S-896.

## **2.8 OCCUPANCY SENSORS**

### **A. Wall Switch Sensor Light Switch, Dual Technology:**

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Eaton (Arrow Hart).
  - b. Hubbell Incorporated; Wiring Device-Kellems.
  - c. Leviton Manufacturing Co., Inc.
2. Description: Switchbox-mounted, combination lighting-control sensor and conventional switch lighting-control unit using dual (ultrasonic and passive infrared) technology.
3. Standards: Comply with UL 20.
4. Rated 960 W at 120 V ac for tungsten lighting, 10 A at 120 V ac or 10 A at 277 V ac for fluorescent or LED lighting, and 1/4 HP at 120 V ac.
5. Adjustable time delay of 20 minutes.
6. Able to be locked to Automatic-On mode.
7. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc.
8. Connections: Provisions for connection to BAS.

### **B. Wall Sensor Light Switch, Passive Infrared:**

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Cooper Industries.
  - b. Hubbell Premise Wiring.
  - c. Leviton Manufacturing Co., Inc.
2. Description: Switchbox-mounted, combination, lighting-control sensor and conventional switch lighting-control unit using passive infrared technology.

3. Standards: Comply with UL 20.
  4. Connections: Provisions for connection to BAS.
  5. Integral relay for connection to BAS.
  6. Adjustable time delay of 20 minutes.
  7. Able to be locked to Automatic-On mode.
  8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc.
- C. Wall Sensor Light Switch, Ultrasonic:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
  2. Description: Switchbox-mounted, combination, lighting-control sensor and conventional switch lighting-control unit using ultrasonic technology.
  3. Standards: Comply with UL 20.
  4. Connections: Provisions for connection to BAS.
  5. Integral relay for connection to BAS.
  6. Adjustable time delay of 20 minutes.
  7. Able to be locked to Automatic-On mode.
  8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc.

## **2.9 DIMMERS**

- A. Wall-Box Dimmers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Incorporated; Wiring Device-Kellems.
    - c. Leviton Manufacturing Co., Inc.
    - d. Lutron Electronics Co., Inc.
  2. Description: Modular, full-wave, solid-state dimmer switch with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
  3. Control: Continuously adjustable slider; with single-pole or three-way switching.

4. Standards: Comply with UL 1472.
5. LED Lamp Dimmer Switches: Modular; compatible with LED lamps; trim potentiometer to adjust low-end dimming; capable of consistent dimming with low end not greater than 20 percent of full brightness.

## **2.10 WALL PLATES**

- A. Single Source: Obtain wall plates from same manufacturer of wiring devices.
- B. Single and combination types shall match corresponding wiring devices.
  1. Plate-Securing Screws: Metal with head color to match plate finish.
  2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
  3. Material for Unfinished Spaces: Smooth, high-impact thermoplastic.
  4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover and listed and labeled for use in wet and damp locations.
- C. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant thermoplastic with lockable cover.
- D. Antimicrobial Cover Plates:
  1. Contact surfaces treated with a coating that kills 99.9 percent of certain common bacteria within two hours when regularly and properly cleaned.
  2. Tarnish resistant.

## **2.11 FLOOR SERVICE FITTINGS**

- A. Flush-Type Floor Service Fittings:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Premise Wiring.
    - c. Thomas & Betts Power Solutions; ABB Group.
  2. Description: Type: Modular, flush-type, dual-service units suitable for wiring method used, with cover flush with finished floor.
  3. Compartments: Barrier separates power from voice and data communication cabling.
  4. Service Plate and Cover: Rectangular, with satin finish.
  5. Power Receptacle: NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.
- B. Flap-Type Service Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Premise Wiring.
  2. Description: Type: Modular, flap-type, dual-service units suitable for wiring method used, with flaps flush with finished floor.
  3. Compartments: Barrier separates power from voice and data communication cabling.
  4. Flaps: Rectangular, with satin finish.
  5. Service Plate: Same finish as flaps.
  6. Power Receptacle: NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.
  7. Data Communication Outlet: Blank cover with bushed cable opening.
- C. Above-Floor Service Fittings:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton (Arrow Hart).
    - b. Hubbell Premise Wiring.
    - c. Thomas & Betts Corporation; A Member of the ABB Group.
  2. Description: Type: Modular, above-floor, dual-service units suitable for wiring method used.
  3. Compartments: Barrier separates power from voice and data communication cabling.
  4. Service Plate: Rectangular, with satin finish.
  5. Power Receptacle: NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.

## **2.12 POKE-THROUGH ASSEMBLIES**

- A. Description: Factory-fabricated and -wired assembly of below-floor junction box with multi-channeled, through-floor raceway/firestop unit and detachable matching floor service-outlet assembly.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Hubbell Incorporated; Wiring Device-Kellems.
  2. Pass & Seymour/Legrand (Pass & Seymour).
  3. Square D; by Schneider Electric.

- C. Standards: Comply with scrub water exclusion requirements in UL 514.
- D. Service-Outlet Assembly: Pedestal type with services indicated, complying with requirements in Section 27 15 13 "Communications Copper Horizontal Cabling."
- E. Size: Selected to fit nominal 4-inch cored holes in floor and matched to floor thickness.
- F. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
- G. Closure Plug: Arranged to close unused 4-inch cored openings and reestablish fire rating of floor.
- H. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors and a minimum of four, four-pair cables that comply with requirements in Section 27 15 13 "Communications Copper Horizontal Cabling."

### **2.13 PREFABRICATED MULTIOUTLET ASSEMBLIES**

- A. Description: Two-piece surface metal raceway, with factory-wired multi-outlet harness.
- B. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Hubbell Incorporated; Wiring Device-Kellems.
- C. Components shall be products from single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.
- D. Raceway Material: Metal, with manufacturer's standard finish.
- E. Multi-outlet Harness:
  - 1. Receptacles: 15-A, 125-V, NEMA WD 6 Configuration 5-15R receptacles complying with NEMA WD 1, UL 498, and FS W-C-596.
  - 2. Receptacle Spacing: As shown.
  - 3. Wiring: No. 12 AWG solid, Type THHN copper, single circuit.

### **2.14 SERVICE POLES**

- A. Dual-Channel Service Poles:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Hubbell Premise Wiring.
  - 2. Description: Factory-assembled and -wired units to extend power and voice and data communication from distribution wiring concealed in ceiling to devices or outlets in pole near floor.
  - 3. Poles: Nominal 2.5-inch-square cross-section, with height adequate to extend from floor to at least 6 inches above ceiling, and with separate channels for power wiring and voice and data communication cabling.

4. Mounting: Ceiling trim flange with concealed bracing arranged for positive connection to ceiling supports; with pole foot and carpet pad attachment.
5. Material: Aluminum.
6. Finishes: Satin-anodized aluminum.
7. Wiring: Sized for minimum of five No. 12 AWG power and ground conductors and a minimum of four, balanced twisted pair data communication cables.
8. Power Receptacles: Two duplex, 20-A, straight-blade receptacles complying with requirements in this Section.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
  1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes, and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
  2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
  3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
  4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
  1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
  2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
  3. The length of free conductors at outlets for devices shall comply with NFPA 70, Article 300, without pigtails.
  4. Existing Conductors:
    - a. Cut back and pigtail, or replace all damaged conductors.
    - b. Straighten conductors that remain and remove corrosion and foreign matter.
    - c. Pig-tailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Verify that dimmers used for fan-speed control are listed for that application.
3. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device, listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

**3.2 GFCI RECEPTACLES**

- A. Install non-feed-through GFCI receptacles where protection of downstream receptacles is not required.



**3.3 IDENTIFICATION**

- A. Comply with Section 26 05 53 "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with white-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.
- C. Essential Electrical System: Mark receptacles supplied from the essential electrical system to allow easy identification using a self-adhesive label.

**3.4 FIELD QUALITY CONTROL**

- A. Test Instruments: Use instruments that comply with UL 1436.
- B. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. In healthcare facilities, prepare reports that comply with NFPA 99.
  - 2. Test Instruments: Use instruments that comply with UL 1436.
  - 3. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- D. Tests for Receptacles:
  - 1. Line Voltage: Acceptable range is 105 to 132 V.
  - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
  - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
  - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
  - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
  - 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault-current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
- E. Test straight-blade convenience outlets in patient-care areas for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz.
- F. Wiring device will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.

**END OF SECTION**

## **PART 1 - GENERAL**

### **1.1 RELATED DOCUMENTS**

- A. Drawings, Owner's General Conditions of the Contract, and Division 01 Specification Sections, apply to this Section.

### **1.2 SUMMARY**

- A. Section Includes:
  - 1. Fusible switches.
  - 2. Non-fusible switches.
  - 3. Receptacle switches.
  - 4. Shunt trip switches.
  - 5. Molded-case circuit breakers (MCCBs).
  - 6. Molded-case switches.
  - 7. Enclosures.

### **1.3 DEFINITIONS**

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

### **1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
  - 1. Enclosure types and details for types other than NEMA 250, Type 1.
  - 2. Current and voltage ratings.
  - 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
  - 4. Include evidence of a nationally recognized testing laboratory (NRTL) listing for series rating of installed devices.
  - 5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
- B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

### **1.5 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For qualified testing agency.
- B. Seismic Qualification Data: Certificates, for enclosed switches and circuit breakers, accessories, and components, from manufacturer.
  1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Field quality-control reports.

### **1.6 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals.
  1. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:
    - a. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
    - b. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

### **1.7 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
  2. Fuse Pullers: Two for each size and type.

### **1.8 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: Accredited by NETA.
  1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

### **1.9 FIELD CONDITIONS**

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
  - 1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
  - 2. Altitude: Not exceeding 6600 feet.

### 1.10 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: One year(s) from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

### 2.2 GENERAL REQUIREMENTS

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with NFPA 70.

### 2.3 FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. ABB Inc.
  - 2. Eaton.
  - 3. General Electric Company.
  - 4. Siemens Industry, Inc., Energy Management Division.

5. Square D
- B. Type HD, Heavy Duty:
1. Single throw.
  2. Three pole.
  3. 600-V ac.
  4. 1200 A and smaller.
  5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses.
  6. Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
  2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
  3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
  4. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 120-V ac.
  5. Hook stick Handle: Allows use of a hook stick to operate the handle.
  6. Lugs: Mechanical type, suitable for number, size, and conductor material.
  7. Service-Rated Switches: Labeled for use as service equipment.

## **2.4 NON-FUSIBLE SWITCHES**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Eaton.
  2. General Electric Company.
  3. Siemens Industry, Inc., Energy Management Division.
  4. Square D
- B. Type HD, Heavy Duty, Three Pole, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Type HD, Heavy Duty, Six Pole, Single Throw, 600-V ac, 200 A and Smaller: UL 98 and

NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

- D. Type HD, Heavy Duty, Three Pole, Double Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- E. Accessories:
  - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
  - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
  - 3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
  - 4. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 120-V ac.
  - 5. Hook stick Handle: Allows use of a hook stick to operate the handle.
  - 6. Lugs: Mechanical type, suitable for number, size, and conductor material.
  - 7. Service-Rated Switches: Labeled for use as service equipment.

## **2.5 RECEPTACLE SWITCHES**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton.
  - 2. General Electric Company.
  - 3. Siemens Industry, Inc., Energy Management Division.
  - 4. Square D
- B. Type HD, Heavy-Duty, Three Pole, Single-Throw Fusible Switch: 600-V ac, A; UL 98 and NEMA KS 1; horsepower rated, with clips or bolt pads to accommodate indicated fuses; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.
- C. Type HD, Heavy-Duty, Three Pole, Single-Throw Non-fusible Switch: 600-V ac, 100 A; UL 98 and NEMA KS 1; horsepower rated, lockable handle with capability to accept three padlocks; interlocked with cover in closed position.
- D. Interlocking Linkage: Provided between the receptacle and switch mechanism to prevent inserting or removing plug while switch is in the on position, inserting any plug other than specified, and turning switch on if an incorrect plug is inserted or correct plug has not been fully inserted into the receptacle.
- E. Receptacle: Polarized, three-phase, four-wire receptacle (fourth wire connected to enclosure

ground lug).

F. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 120-V ac.
5. Hook stick Handle: Allows use of a hook stick to operate the handle.
6. Lugs: Mechanical type, suitable for number, size, and conductor material.
7. Service-Rated Switches: Labeled for use as service equipment.

**2.6 SHUNT TRIP SWITCHES**

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Bussmann, an Eaton business.
2. Littelfuse, Inc.

B. General Requirements: Comply with ASME A17.1, UL 50, and UL 98, with Class J fuse block and 200-kA interrupting and short-circuit current rating.

C. Type HD, Heavy-Duty, Three Pole, Single-Throw Fusible Switch: 600-V ac, 100 A; UL 98 and NEMA KS 1; integral shunt trip mechanism; horsepower rated, with clips or bolt pads to accommodate fuses; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

D. Type HD, Heavy-Duty, Three Pole, Single-Throw Nonfusible Switch: 600-V ac, 100 A; UL 98 and NEMA KS 1; integral shunt trip mechanism; horsepower rated, lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

E. Control Circuit: 120-V ac; obtained from integral control power transformer, with primary and secondary fuses, with a control power transformer of enough capacity to operate shunt trip, pilot, indicating and control devices.

F. Accessories:

1. Oil-tight key switch for key-to-test function.
2. Oil-tight red ON pilot light.
3. Isolated neutral lug; 100 percent rating.

4. Mechanically interlocked auxiliary contacts that change state when switch is opened and closed.
5. Form C alarm contacts that change state when switch is tripped.
6. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
7. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
8. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 120-V ac.
9. Hook stick Handle: Allows use of a hook stick to operate the handle.
10. Lugs: Mechanical type, suitable for number, size, and conductor material.
11. Service-Rated Switches: Labeled for use as service equipment.

## **2.7 MOLDED-CASE CIRCUIT BREAKERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Eaton.
  2. General Electric Company.
  3. NOARK Electric North America.
  4. Siemens Industry, Inc., Energy Management Division.
  5. Square D
- B. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.
- C. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.
- D. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be 100 percent rated.
- E. MCCBs shall be equipped with a device for locking in the isolated position.
- F. Lugs shall be suitable for 140 deg F rated wire on 125-A circuit breakers and below.



- G. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.
- H. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- I. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
- J. Electronic Trip Circuit Breakers: Field-replaceable rating plug, RMS sensing, with the following field-adjustable settings:
  - 1. Instantaneous trip.
  - 2. Long- and short-time pickup levels.
  - 3. Long- and short-time time adjustments.
  - 4. Ground-fault pickup level, time delay, and I-squared t response.
- K. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.
- L. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.
- M. Ground-Fault Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
- N. Ground-Fault Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).
- O. Features and Accessories:
  - 1. Standard frame sizes, trip ratings, and number of poles.
  - 2. Lugs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
  - 3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
  - 4. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero- sequence current transformer/sensor.
  - 5. Communication Capability: Circuit-breaker-mounted communication module with functions and features compatible with power monitoring and control system, specified in Section 260913 "Electrical Power Monitoring and Control."
  - 6. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
  - 7. Under-voltage Trip: Set to operate at 35 to 75 percent of rated voltage without

intentional time delay.

8. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
9. Alarm Switch: One NO contact that operates only when circuit breaker has tripped.
10. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
11. Electrical Operator: Provide remote control for on, off, and reset operations.
12. Accessory Control Power Voltage: Integrally mounted, self-powered.

## 2.8 MOLDED-CASE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Eaton.
  2. General Electric Company.
  3. NOARK Electric North America.
  4. Siemens Industry, Inc., Energy Management Division.
  5. Square D
- B. Description: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.
- C. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.
- D. Features and Accessories:
  1. Standard frame sizes and number of poles.
  2. Lugs:
    - a. Mechanical type, suitable for number, size, trip ratings, and conductor material.
    - b. Lugs shall be suitable for 140 deg F rated wire on 125-A circuit breakers and below.
  3. Ground-Fault Protection: Comply with UL 1053; remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
  4. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
  5. Under-voltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.

6. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic switch contacts, "b" contacts operate in reverse of switch contacts.
7. Alarm Switch: One NO contact that operates only when switch has tripped.
8. Key Interlock Kit: Externally mounted to prohibit switch operation; key shall be removable only when switch is in off position.
9. Zone-Selective Interlocking: Integral with ground-fault shunt trip unit; for interlocking ground-fault protection function.
10. Electrical Operator: Provide remote control for on, off, and reset operations.

## **2.9 ENCLOSURES**

- A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
- B. Enclosure Finish: The enclosure shall be finished with gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250) Type 1.
- C. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 Types 7 and 9 enclosures shall be provided with threaded conduit openings in both end walls.
- D. Operating Mechanism: The circuit-breaker operating handle shall be externally operable with the operating mechanism being an integral part of the box, not the cover. The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.
- E. Enclosures designated as NEMA 250 Type 4, 4X stainless steel, 12, or 12K shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.
- F. NEMA 250 Type 7/9 enclosures shall be furnished with a breather and drain kit to allow their use in outdoor and wet location applications.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
  1. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

### **3.2 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS**

- A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.
  - 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
  - 2. Outdoor Locations: NEMA 250, Type 4X.
  - 3. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
  - 4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.

### **3.3 INSTALLATION**

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- C. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."
- D. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- E. Install fuses in fusible devices.
- F. Comply with NFPA 70 and NECA 1.

### **3.4 IDENTIFICATION**

- A. Comply with requirements in Section 26 05 53 "Identification for Electrical Systems."
  - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
  - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

### **3.5 FIELD QUALITY CONTROL**

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections with the assistance of a factory-authorized service representative.
- D. Tests and Inspections for Switches:
  - 1. Visual and Mechanical Inspection:
    - a. Inspect physical and mechanical condition.

- b. Inspect anchorage, alignment, grounding, and clearances.
  - c. Verify that the unit is clean.
  - d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
  - e. Verify that fuse sizes and types match the Specifications and Drawings.
  - f. Verify that each fuse has adequate mechanical support and contact integrity.
  - g. Inspect bolted electrical connections for high resistance using one of the two following methods:
    - i. Use a low-resistance ohmmeter.
      - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
    - ii. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
      - a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
  - h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
  - i. Verify correct phase barrier installation.
  - j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.
2. Electrical Tests:
- a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
  - b. Measure contact resistance across each switchblade fuse holder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
  - c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
  - d. Measure fuse resistance. Investigate fuse-resistance values that deviate from

each other by more than 15 percent.

- e. Perform ground fault test according to NETA ATS 7.14 "Ground Fault Protection Systems, Low-Voltage."

E. Tests and Inspections for Molded Case Circuit Breakers:

1. Visual and Mechanical Inspection:

- a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
- b. Inspect physical and mechanical condition.
- c. Inspect anchorage, alignment, grounding, and clearances.
- d. Verify that the unit is clean.
- e. Operate the circuit breaker to ensure smooth operation.
- f. Inspect bolted electrical connections for high resistance using one of the two following methods:
  - i. Use a low-resistance ohmmeter.
    - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
  - ii. Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
    - a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
- g. Inspect operating mechanism, contacts, and chutes in unsealed units.
- h. Perform adjustments for final protective device settings in accordance with the coordination study.

2. Electrical Tests:

- a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
- b. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.

- c. Perform a contact/pole resistance test. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
  - d. Perform insulation resistance tests on all control wiring with respect to ground. Applied potential shall be 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable. Test duration shall be one minute. For units with solid state components, follow manufacturer's recommendation. Insulation resistance values shall be no less than two meg-ohms.
  - e. Determine the following by primary current injection:
    - i. Long-time pickup and delay. Pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
    - ii. Short-time pickup and delay. Short-time pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
    - iii. Ground-fault pickup and time delay. Ground-fault pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
    - iv. Instantaneous pickup. Instantaneous pickup values shall be as specified and within manufacturer's published tolerances.
  - f. Perform minimum pickup voltage tests on shunt trip and close coils in accordance with manufacturer's published data. Minimum pickup voltage of the shunt trip and close coils shall be as indicated by manufacturer.
  - g. Verify correct operation of auxiliary features such as trip and pickup indicators; zone interlocking; electrical close and trip operation; trip-free, anti-pump function; and trip unit battery condition. Reset all trip logs and indicators. Investigate units that do not function as designed.
  - h. Verify operation of charging mechanism. Investigate units that do not function as designed.
3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
  4. Perform the following infrared scan tests and inspections and prepare reports:
    - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.
    - b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each enclosed switch and circuit breaker 11 months after date of Substantial Completion.
    - c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values.

Provide calibration record for device.

5. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- F. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- G. Prepare test and inspection reports.
  1. Test procedures used.
  2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
  3. List deficiencies detected, remedial action taken, and observations after remedial action.

### **3.6 ADJUSTING**

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as specified in Section "Coordination Studies."

**END OF SECTION**



**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes the following types of LED luminaires:
  - 1. Cylinder.
  - 2. Downlight.
  - 3. Linear industrial.
  - 4. Recessed, linear.
  - 5. Strip light.
  - 6. Surface mount, linear.
  - 7. Surface mount, nonlinear.
  - 8. Suspended, linear.
  - 9. Suspended, nonlinear.
- B. Related Requirements:
  - 1. Section 26 09 23 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

**1.3 DEFINITIONS**

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product.

1. Arrange in order of luminaire designation.
  2. Include data on features, accessories, and finishes.
  3. Include physical description and dimensions of luminaires.
  4. Include emergency lighting units, including batteries and chargers.
  5. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
  6. Photometric data and adjustment factors based on laboratory tests, complying with IES "Lighting Measurements Testing and Calculation Guides" for each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project, IES LM-79, and, IES LM-80.
    - a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
    - b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
- B. Shop Drawings: For nonstandard or custom luminaires.
1. Include plans, elevations, sections, and mounting and attachment details.
  2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  3. Include diagrams for power, signal, and control wiring.
- C. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

### **1.5 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Luminaires.
  2. Suspended ceiling components.
  3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches (300 mm) of the plane of the luminaires.
  4. Structural members to which equipment and or luminaires will be attached.
  5. Initial access modules for acoustical tile, including size and locations.
  6. Items penetrating finished ceiling, including the following:
    - a. Other luminaires.

- b. Air outlets and inlets.
  - c. Speakers.
  - d. Sprinklers.
  - e. Access panels.
  - f. Ceiling-mounted projectors.
7. Moldings.
- B. Qualification Data: For testing laboratory providing photometric data for luminaires.
- C. Seismic Qualification Data: For luminaires, accessories, and components, from manufacturer.
- 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Product Certificates: For each type of luminaire.
- E. Product Test Reports: For each type of luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency.
- F. Sample warranty.

#### **1.6 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.
- 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

#### **1.7 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
- 1. Lamps: Ten for every 100 of each type and rating installed. Furnish at least one of each type.
  - 2. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
  - 3. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

#### **1.8 QUALITY ASSURANCE**

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Provide luminaires from a single manufacturer for each luminaire type.
- C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.
- D. Mockups: For interior luminaires in room or module mockups, complete with power and control connections.
  - 1. Obtain Architect's approval of luminaires in mockups before starting installations.
  - 2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### **1.9 DELIVERY, STORAGE, AND HANDLING**

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

#### **1.10 WARRANTY**

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
- B. Warranty Period: Five year(s) from date of Substantial Completion.

### **PART 2 - PRODUCTS**

#### **2.1 PERFORMANCE REQUIREMENTS**

- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified."
- B. Ambient Temperature: 5 to 104 deg F.
- C. Altitude: Sea level to 1000 feet.

#### **2.2 LUMINAIRE REQUIREMENTS**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- B. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
  - 1. Label shall include the following lamp characteristics:
    - a. "USE ONLY" and include specific lamp type.
    - b. Lamp diameter, shape, size, wattage, and coating.
    - c. CCT and CRI.
- C. Recessed luminaires shall comply with NEMA LE 4.
- D. California Title 24 compliant.

### **2.3 CYLINDER**

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Albeo Technologies, Inc; A GE Company.
  - 2. Amerlux.
  - 3. Architectural Lighting Works.
  - 4. Axis Lighting, Inc.
  - 5. Cooper Lighting, an Eaton business.
  - 6. Edge Lighting.
  - 7. Edison Price Lighting.
  - 8. Eureka.
  - 9. Focal Point.
  - 10. GE Lighting Solutions.
  - 11. Juno Lighting Group by Schneider Electric.
  - 12. Lighting Science Group
  - 13. Lightolier; a Philips group brand.
  - 14. Lithonia Lighting; Acuity Brands Lighting, Inc.
  - 15. MP Lighting.
  - 16. OSRAM SYLVANIA.
  - 17. Pure Lighting.

18. Sea Gull Lighting.
  19. Selux Corporation.
  20. Specialty Lighting Industries, Inc.
  21. Tech Lighting.
- B. Nominal Operating Voltage: 120 V ac or 277 V ac.
- C. Lamp:
1. Minimum 1000 lm.
  2. Minimum allowable efficacy of 80 lm/W.
  3. CRI of 80. CCT of 2700 K, 3000 K or 4100 K.
  4. Rated lamp life of 50,000 hours to L70.
  5. Dimmable from 100 percent to 0 percent of maximum light output.
  6. Internal driver.
  7. User-Replaceable Lamps:
    - a. Bulb shape complying with ANSI C78.79.
    - b. Lamp base complying with ANSI C81.61 or IEC 60061-1.
  8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
- D. Housings:
1. Extruded-aluminum housing and heat sink.
  2. Clear finish.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
1. Tempered Fresnel glass.
  2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  3. Glass: Annealed crystal glass unless otherwise indicated.
  4. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
- G. With integral mounting provisions.

H. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.

**2.4 DOWNLIGHT**

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Amerlux.
2. Architectural Lighting Works.
3. Cooper Lighting, an Eaton business.
4. Edge Lighting.
5. Edison Price Lighting.
6. Elite Lighting Corporation.
7. Eureka.
8. Focal Point LLC.
9. Gallium Lighting, LLC.
10. GE Lighting Solutions.
11. Juno Lighting Group by Schneider Electric.
12. Lighting Science Group.
13. Lighting Services Inc.
14. Lightolier; a Philips group brand.
15. Lithonia Lighting; Acuity Brands Lighting, Inc.
16. MP Lighting.
17. OSRAM SYLVANIA.
18. Peerless: Acuity Brands Lighting, Inc.
19. Pure Lighting.
20. RAB Lighting.
21. Sea Gull Lighting.

22. Specialty Lighting Industries, Inc.
23. Tech Lighting.
- B. Nominal Operating Voltage: 120 V ac or 277 V ac.
- C. Lamp
  1. Minimum 1000 lm.
  2. Minimum allowable efficacy of 80 lm/W.
  3. CRI of 80. CCT of 2700 K, 3000 K or 4100 K.
  4. Rated lamp life of 50,000 hours to L70.
  5. Dimmable from 100 percent to 0 percent of maximum light output.
  6. Internal driver.
  7. User-Replaceable Lamps:
    - a. Bulb shape complying with ANSI C78.79.
    - b. Lamp base complying with ANSI C81.61 or IEC 60061-1.
  8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
- D. Housings:
  1. Extruded-aluminum housing and heat sink.
  2. Clear finish.
  3. Universal mounting bracket.
  4. Integral junction box with conduit fittings.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
  1. Adjustable lens.
  2. Wide light distribution.
  3. Tempered Fresnel glass.
  4. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  5. Glass: Annealed crystal glass unless otherwise indicated.



6. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

G. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.
4. Recessed luminaires shall comply with NEMA LE 4.

## **2.5 LINEAR INDUSTRIAL**

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Albeo Technologies, Inc; A GE Company.
2. Axlen LED Lighting.
3. Cooper Lighting, an Eaton business.
4. GE Lighting Solutions.
5. Lighting Science Group.
6. Lithonia Lighting; Acuity Brands Lighting, Inc.
7. OSRAM SYLVANIA.
8. RAB Lighting.

B. Lamp:

1. Minimum 5,000 lm.
2. Minimum allowable efficacy of 80 lm/W.
3. CRI of 80. CCT of 2700 K, 3000 K or 4100 K.
4. Rated lamp life of 50,000 hours to L70.
5. Dimmable from 100 percent to 0 percent of maximum light output.
6. Internal driver.
7. User-Replaceable Lamps:
  - a. Bulb shape complying with ANSI C78.79.
  - b. Lamp base complying with ANSI C81.61 or IEC 60061-1.
8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

C. Housings:

1. Extruded-aluminum housing and heat sink.
  2. Clear finish.
- D. Housing and Heat Sink Rating:
1. NEMA 4X.
  2. IP 54.
  3. IP 66.
  4. Marine and wet locations.
  5. CSA C22.2 No 137.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
1. Tempered Fresnel glass.
  2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  3. Glass: Annealed crystal glass unless otherwise indicated.
  4. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
- G. With integral mounting provisions.
- H. Standards:
1. ENERGY STAR certified.
  2. RoHS compliant.

**2.6 RECESSED, LINEAR**

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Albeo Technologies, Inc; A GE Company.
  2. Architectural Lighting Works.
  3. Axis Lighting, Inc.
  4. Cooper Lighting, an Eaton business.
  5. Elite Lighting Corporation.

6. Finelite.
  7. Focal Point LLC.
  8. GE Lighting Solutions.
  9. Lithonia Lighting; Acuity Brands Lighting, Inc.
  10. Lumen Pulse.
  11. ON-Q Lighting Systems.
  12. OSRAM SYLVANIA.
  13. RAB Lighting.
  14. Selux Corporation.
- B. Nominal Operating Voltage: 120 V ac or 277 V ac.
- C. Lamp:
1. Minimum 3,000 lm.
  2. Minimum allowable efficacy of 85 lm/W.
  3. CRI of 80. CCT of 2700 K, 3000 K or 4100 K.
  4. Rated lamp life of 50,000 hours to L70.
  5. Dimmable from 100 percent to 0 percent of maximum light output.
  6. Internal driver.
  7. User-Replaceable Lamps:
    - a. Bulb shape complying with ANSI C78.79.
    - b. Lamp base complying with ANSI C81.61 or IEC 60061-1.
  8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
- D. Housings:
1. Extruded-aluminum housing and heat sink.
  2. Clear finish.
  3. With integral mounting provisions.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

- F. Diffusers and Globes:
  - 1. Tempered Fresnel glass.
  - 2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  - 3. Glass: Annealed crystal glass unless otherwise indicated.
  - 4. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
- G. Standards:
  - 1. ENERGY STAR certified.
  - 2. RoHS compliant.
  - 3. UL Listing: Listed for damp location.
  - 4. NEMA LE 4.

## **2.7 STRIP LIGHT**

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Big Ass Fans.
  - 2. Cooper Lighting, an Eaton business.
  - 3. Flexfire LEDs, Inc.
  - 4. GE Lighting Solutions.
  - 5. Lighting Science Group.
  - 6. Lithonia Lighting; Acuity Brands Lighting, Inc.
  - 7. OSRAM SYLVANIA.
  - 8. Philips Lighting Company.
  - 9. Stile Lighting.
- B. Nominal Operating Voltage: 120 V ac or 277 V ac.
- C. Lamp:
  - 1. Minimum 750 lm.
  - 2. Minimum allowable efficacy of 80 lm/W.
  - 3. CRI of 80. CCT of 2700 K, 3000 K or 4100 K.
  - 4. Rated lamp life of 50,000 hours to L70.

5. Dimmable from 100 percent to 0 percent of maximum light output.
  6. Internal driver.
  7. User-Replaceable Lamps:
    - a. Bulb shape complying with ANSI C78.79.
    - b. Lamp base complying with ANSI C81.61 or IEC 60061-1.
  8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
- D. Housings:
1. Extruded-aluminum housing and heat sink.
  2. Clear finish.
  3. With integral mounting provisions.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping of luminaire without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
1. Tempered Fresnel glass.
  2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  3. Glass: Annealed crystal glass unless otherwise indicated.
  4. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
- G. Standards:
1. ENERGY STAR certified.
  2. RoHS compliant.
  3. UL Listing: Listed for damp location.

## **2.8 SURFACE MOUNT, LINEAR**

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Albeo Technologies, Inc; A GE Company.
  2. Architectural Lighting Works.
  3. Axis Lighting, Inc.

4. Cooper Lighting, an Eaton business.
  5. Elite Lighting Corporation.
  6. Finelite.
  7. Focal Point LLC.
  8. GE Lighting Solutions.
  9. Lighting Science Group.
  10. Lightolier; a Philips group brand.
  11. Lithonia Lighting; Acuity Brands Lighting, Inc.
  12. Lumen Pulse.
  13. MP Lighting.
  14. OSRAM SYLVANIA.
  15. Pure Lighting.
  16. Specialty Lighting Industries, Inc.
  17. Stile Lighting.
  18. Tech Lighting.
  19. The Lighting Quotient.
- B. Nominal Operating Voltage: 120 V ac 277 V ac.
- C. Lamp:
1. Minimum 750 lm.
  2. Minimum allowable efficacy of 80 lm/W.
  3. CRI of 80. CCT of 2700 K 3000 K 4100 K.
  4. Rated lamp life of 50,000 hours to L70.
  5. Dimmable from 100 percent to 0 percent of maximum light output.
  6. Internal driver.
  7. User-Replaceable Lamps:
    - a. Bulb shape complying with ANSI C78.79.
    - b. Lamp base complying with ANSI C81.61 or IEC 60061-1.
  8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

- D. Housings:
  - 1. Extruded-aluminum housing and heat sink.
  - 2. Clear finish.
  - 3. With integral mounting provisions.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Components are designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- F. Diffusers and Globes:
  - 1. Tempered Fresnel glass.
  - 2. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  - 3. Glass: Annealed crystal glass unless otherwise indicated.
  - 4. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.
- G. Standards:
  - 1. ENERGY STAR certified.
  - 2. RoHS compliant.
  - 3. UL Listing: Listed for damp location.

## **2.9 MATERIALS**

- A. Metal Parts:
  - 1. Free of burrs and sharp corners and edges.
  - 2. Sheet metal components shall be steel unless otherwise indicated.
  - 3. Form and support to prevent warping and sagging.
- B. Steel:
  - 1. ASTM A 36/A 36M for carbon structural steel.
  - 2. ASTM A 568/A 568M for sheet steel.
- C. Stainless Steel:
  - 1. 1. Manufacturer's standard grade.
  - 2. 2. Manufacturer's standard type, ASTM A 240/240 M.
- D. Galvanized Steel: ASTM A 653/A 653M.

- E. Aluminum: ASTM B 209.

## **2.10 METAL FINISHES**

- A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

## **2.11 LUMINAIRE SUPPORT**

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
- C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage.
- D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 TEMPORARY LIGHTING**

- A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

### **3.3 INSTALLATION**

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps in each luminaire.
- D. Supports:



1. Sized and rated for luminaire weight.
  2. Able to maintain luminaire position after cleaning and relamping.
  3. Provide support for luminaire without causing deflection of ceiling or wall.
  4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- E. Flush-Mounted Luminaires:
1. Secured to outlet box.
  2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
  3. Trim ring flush with finished surface.
- F. Wall-Mounted Luminaires:
1. Attached to structural members in walls.
  2. Do not attach luminaires directly to gypsum board.
- G. Suspended Luminaires:
1. Ceiling Mount:
    - a. Two 5/32-inch- diameter aircraft cable supports adjustable to 10 feet in length.
    - b. Pendant mount with 5/32-inch- diameter aircraft cable supports adjustable to 10 feet in length.
    - c. Hook mount.
  2. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
  3. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
  4. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of luminaire chassis, including one at each end.
  5. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.
- H. Ceiling-Grid-Mounted Luminaires:
1. Secure to any required outlet box.
  2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.

- I. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

### **3.4 IDENTIFICATION**

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### **3.5 FIELD QUALITY CONTROL**

- A. Perform the following tests and inspections:
  1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
  2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.

### **3.6 STARTUP SERVICE**

- A. Comply with requirements for startup specified in Section 260943.23 "Relay-Based Lighting Controls."

### **3.7 ADJUSTING**

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
  1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
  2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  3. Adjust the aim of luminaires in the presence of the Architect.

**END OF SECTION**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Emergency lighting units.
  - 2. Exit signs.
  - 3. Luminaire supports.

**1.3 DEFINITIONS**

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Emergency Lighting Unit: A lighting unit with internal or external emergency battery powered supply and the means for controlling and charging the battery and unit operation.
- D. Fixture: See "Luminaire" Paragraph.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of emergency lighting unit, exit sign, and emergency lighting support.
  - 1. Include data on features, accessories, and finishes.
  - 2. Include physical description of the unit and dimensions.
  - 3. Battery and charger for light units.
  - 4. Include life, output of luminaire (lumens, CCT, and CRI), and energy-efficiency data.
  - 5. Include photometric data and adjustment factors based on laboratory tests, complying with IES LM-45, for each luminaire type.
    - a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Shop Drawings: For nonstandard or custom luminaires.

1. Include plans, elevations, sections, and mounting and attachment details.
  2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  3. Include diagrams for power, signal, and control wiring.
- C. Product Schedule:
1. For emergency lighting units. Use same designations indicated on Drawings.
  2. For exit signs. Use same designations indicated on Drawings.

### **1.5 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Luminaires.
  2. Suspended ceiling components.
  3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches of the plane of the luminaires.
  4. Structural members to which equipment will be attached.
  5. Size and location of initial access modules for acoustical tile.
  6. Items penetrating finished ceiling including the following:
    - a. Other luminaires.
    - b. Air outlets and inlets.
    - c. Speakers.
    - d. Ceiling-mounted projectors.
    - e. Sprinklers.
    - f. Access panels.
  7. Moldings.
- B. Qualification Data: For testing laboratory providing photometric data for luminaires.
- C. Product Certificates: For each type of luminaire.
- D. Seismic Qualification Data: For luminaires, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

4. Provide seismic qualification certificate for each piece of equipment.
- E. Product Test Reports: For each luminaire for tests performed by manufacturer and witnessed by a qualified testing agency.
- F. Sample Warranty: For manufacturer's warranty.

#### **1.6 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For luminaires and lighting systems to include in emergency, operation, and maintenance manuals.
  1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

#### **1.7 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Lamps: 10 for every 100 of each type and rating installed. Furnish at least one of each type.
  2. Luminaire-mounted, emergency battery pack: One for every 50 emergency lighting units. Furnish at least one of each type.
  3. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
  4. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

#### **1.8 QUALITY ASSURANCE**

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.
- B. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
- C. Mockups: For interior luminaires in room or module mockups, complete with power and control connections.
  1. Obtain Architect's approval of luminaires and signs in mockups before starting installations.
  2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

### **1.9 DELIVERY, STORAGE, AND HANDLING**

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

### **1.10 WARRANTY**

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
  1. Warranty Period: Two year(s) from date of Substantial Completion.
- B. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
  1. Warranty Period for Emergency Power Unit Batteries: Five years from date of Substantial Completion. Full warranty shall apply for first year and prorated warranty for the remaining four years.
  2. Warranty Period for Self-Powered Exit Sign Batteries: Five years from date of Substantial Completion. Full warranty shall apply for first year and prorated warranty for the remaining six years.

## **PART 2 - PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7. Luminaires and lamps shall be labeled vibration and shock resistant.
  1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

### **2.2 GENERAL REQUIREMENTS FOR EMERGENCY LIGHTING**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NRTL Compliance: Fabricate and label emergency lighting units, exit signs, and batteries to comply with UL 924.
- C. Comply with NFPA 70 and NFPA 101.
- D. Comply with NEMA LE 4 for recessed luminaires.
- E. Comply with UL 1598 for fluorescent luminaires.

- F. Internal Type Emergency Power Unit: Self-contained, modular, battery-inverter unit, factory mounted within luminaire body and compatible with ballast.
1. Emergency Connection: Operate one lamp(s) continuously at an output of 1100 lumens each upon loss of normal power. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire ballast.
  2. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
  3. Nightlight Connection: Operate lamp continuously at 40 percent of rated light output.
  4. Test Push-Button and Indicator Light: Visible and accessible without opening luminaire or entering ceiling space.
    - a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    - b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
  5. Battery: Sealed, maintenance-free, nickel-cadmium type.
  6. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
  7. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.
- G. External Type: Self-contained, modular, battery-inverter unit, suitable for powering one or more lamps, remote mounted from luminaire.
1. Emergency Connection: Operate one LED lamp continuously. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire.
  2. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
  3. Nightlight Connection: Operate lamp in a remote luminaire continuously.
  4. Battery: Sealed, maintenance-free, nickel-cadmium type.
  5. Charger: Fully automatic, solid-state, constant-current type.
  6. Housing: NEMA 250, Type 1 enclosure listed for installation inside, on top of, or remote from luminaire. Remote assembly shall be located no less than half the distance recommended by the emergency power unit manufacturer, whichever is less.
  7. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power

and demonstrates unit operability.

8. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
9. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

### **2.3 EMERGENCY LIGHTING**

- A. General Requirements for Emergency Lighting Units: Self-contained units.
- B. Emergency Luminaires:
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Amerlux.
    - b. Architectural Lighting Works.
    - c. Cooper Lighting, an Eaton business.
    - d. Dual-Lite.
    - e. GE Lighting Solutions.
    - f. Juno Lighting Group by Schneider Electric.
    - g. Lightolier; a Philips group brand.
    - h. Lithonia Lighting; Acuity Brands Lighting, Inc.
    - i. Philips Lighting Company.
  2. Emergency Luminaires: as indicated on Interior Luminaire Schedule Drawings with the following additional features:
    - a. Operating at nominal voltage of 120 V ac or 277 V ac.
    - b. Internal emergency power unit.
    - c. Rated for installation in damp locations, and for sealed and gasketed luminaires in wet locations.
    - d. UL 94 5VA flame rating.

### **2.4 EXIT SIGNS**

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:



1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Amerlux.
    - b. Cooper Lighting, an Eaton business.
    - c. Evenlite, Inc.
    - d. Hubbell Industrial Lighting; Hubbell Incorporated.
    - e. Lithonia Lighting; Acuity Brands Lighting, Inc.
    - f. Philips Lighting Company.
    - g. Ruud Lighting Direct.
  2. Operating at nominal voltage of 120 V ac or 277 V ac.
  3. Lamps for AC Operation: LEDs; 50,000 hours minimum rated lamp life.
  4. Self-Powered Exit Signs (Battery Type): Internal emergency power unit.
  5. Master/Remote Sign Configurations:
    - a. Master Unit: Comply with requirements above for self-powered exit signs, and provide additional capacity in LED power supply for power connection to remote unit.
    - b. Remote Unit: Comply with requirements above for self-powered exit signs, except omit power supply, battery, and test features. Arrange to receive full power requirements from master unit. Connect for testing concurrently with master unit as a unified system.
- C. Self-Luminous Signs:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Cooper Lighting, an Eaton business.
    - b. Dual-Lite.
    - c. Evenlite, Inc.
    - d. Isolite Corporation.
    - e. Lithonia Lighting; Acuity Brands Lighting, Inc.
    - f. LSI Industries.
    - g. Merit Lighting, LLC.

**2.5 MATERIALS**

- A. Metal Parts:
  - 1. Free of burrs and sharp corners and edges.
  - 2. Sheet metal components shall be steel unless otherwise indicated.
  - 3. Form and support to prevent warping and sagging.
- B. Doors, Frames, and Other Internal Access:
  - 1. Smooth operating, free of light leakage under operating conditions.
  - 2. Designed to permit relamping without use of tools.
  - 3. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- C. Diffusers and Globes:
  - 1. Tempered Fresnel glass.
  - 2. Glass: Annealed crystal glass unless otherwise indicated.
  - 3. Acrylic: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  - 4. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
- D. Housings:
  - 1. Extruded aluminum housing and heat sink.
  - 2. Clear finish.
- E. Conduit: Rigid galvanized steel, minimum 3/4 inch in diameter.

## **2.6 METAL FINISHES**

- A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## **2.7 LUMINAIRE SUPPORT COMPONENTS**

- A. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.
- B. Support Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage.

## **2.8 WIREGUARD**

- A. Provide wireguard for fixtures in the Gym area.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for conditions affecting performance of luminaires.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Examine walls, floors, roofs, and ceilings for suitable conditions where emergency lighting luminaires will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 INSTALLATION**

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Ceiling Grid Mounted Luminaires:
  - 1. Secure to any required outlet box.
  - 2. Secure emergency power unit using approved fasteners in a minimum of four locations, spaced near corners of emergency power unit.
  - 3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

**3.3 IDENTIFICATION**

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

**3.4 FIELD QUALITY CONTROL**

- A. Perform the following tests and inspections:
  - 1. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.

**3.5 STARTUP SERVICE**

- A. Perform startup service:
  - 1. Charge emergency power units and batteries minimum of one hour and depress switch to conduct short-duration test.
  - 2. Charge emergency power units and batteries minimum of 24 hours and conduct one-

hour discharge test.

**3.6 ADJUSTING**

- A. Adjustments: Within 12 months of date of Substantial Completion, provide on-site visit to do the following:
  - 1. Inspect all luminaires. Replace lamps, emergency power units, batteries, signs, or luminaires that are defective.
    - a. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  - 2. Conduct short-duration tests on all emergency lighting.

**END OF SECTION**